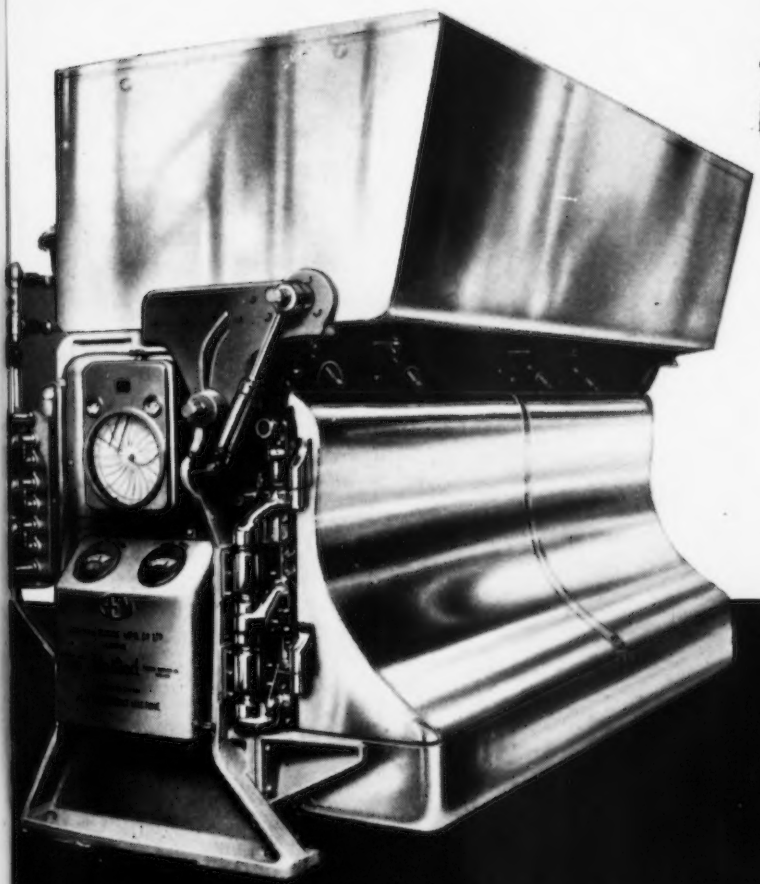
FOOD MANUFACTURE

Incorporating Food Industries Weekly

LEONARD HILL LIMITED, 17, STRATFORD PLACE, LONDON, W. 1 SEPTEMBER 1, 1945



"Staybrite"

SUPER STAINLESS STEEL

The ideal metal for all purposes in the Milk Industry.

The illustration shows a Milk Treatment Machine.

FIRTH-VICKERS STAINLESS STEELS LIMITED

SUNVIC — CONTROL SIMPLIFIED ELECTRICALLY

Refrigerator Thermostat

for remarkably
accurate control.

- Wide range
- Rapid adjustment
- Robust construction
- Small time lag
- No mercury or glass
- Sensitive to $\frac{1}{10}$ °C.

Write now for technical publication No. 109-2/9 free on request.

**SUNVIC T.S.3
ADJUSTABLE
THERMOSTAT**

HOTWIRE VACUUM SWITCHES (only makers)
●
RELAYS for all purposes
●
THERMOSTATS
●
ENERGY REGULATORS

SUNVIC CONTROLS LIMITED
NO. 1, KINGSWAY LONDON, W.C.2

TAS/SC.41

FOOD MANUFACTURE

Vol. XVIII, No. 9 September 1, 1943

Contents

	Page
Editorial	285
Dehydration Factory No. 1. T. Crosbie-Walsh, F.I.C.	289
The Deterioration of Molasses in Storage. William L. Owen	292
Rothamsted, 1843-1943	293
Chemical Executive's Vade Mecum	295
Ministry of Food: Latest Statutory Rules and Orders	296
Nutrition in Infancy	297
New Methods of Welding. C. W. Brett, M.Inst.W.	300
The Problem of Surplus Food Products. F. Le Gros Clark, B.A.	302
The Institute of Physics	304
Rennet. N. J. Berridge, Ph.D., A.I.C.	305
Canadian Fish for the United Kingdom	309
Cleansing of Churns	309
New Process for Bread	310
News from the Industry	311
Information and Advice	319
Recent Patents, Trade Marks and New Companies	320

Published on the first day of the Month
by
LEONARD HILL LIMITED
17, Stratford Place, London, W.1
Telephone: Mayfair 7383

SUBSCRIPTION

Single Copies	1s.
Annual Subscription	10s.
Abroad	12s. 6d.

The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Cost of Food Distribution

IN the House of Lords recently Lord Luke referred to the statement that the cost of distribution of food consumed in the country in a pre-war year was £850,000,000, and asked whether any similar estimates are available on a comparable basis for a later period.

In reply, Lord Woolton said that he was glad to have the opportunity of clearing up the misconception which appears to exist in regard to the figures quoted, which included all forms of drink as well as food. The sum of £850,000,000 in a pre-war year does not represent solely costs of distribution, but includes other important items in the make-up of the final prices to consumers. In particular, it covers the entire cost of processing, manufacturing and otherwise preparing for sale, whether for consumption in the home or in catering establishments, and the entire amount—roughly £150,000,000—of Customs and Excise duties on food and drink. If allowance could be made for these items, the cost of distribution proper would be far less than the figure quoted, and the resultant margin would cover all costs within this country for transportation and delivery of primary foodstuffs and finished products, as well as overhead expenses—rent, salaries, storage, etc.—and profits of trading besides such ancillary items as storage, deterioration, wastage, breaking bulk and packing.

The Ministry of Food has attempted to estimate for 1942 the cost of distributing finished foodstuffs to the civilian population, but Lord Woolton emphasised that no comparison is warranted between those estimates and those referred to in the question. The estimates of the Ministry covered all foodstuffs except chocolate and sugar confectionery, while alcoholic beverages and mineral waters were also excluded.

The retail cost to the consumer of the commodities covered by the enquiry is estimated not to exceed £1,350,000,000, whereas the value at which they enter the chain of distribution in their finished state is calculated at rather more than £900,000,000. Thus the costs of distribution of food ready for sale to the consumer are unlikely to have greatly exceeded £400,000,000. By far the greater part of this total would be attributable to retail distribution.

Post-War Milk Policy

The Central Milk Distributive Committee has written what may prove to be its own obituary notice. It is described as "A Post-war Policy for the Milk Industry of Great Britain", and follows the lines foreshadowed in FOOD MANUFACTURE. The document has now been submitted to the Ministers of Food, Agriculture, and Health, and to the President of the Board of Trade.

The policy is set out in 28 paragraphs which deal with the *principles* of reconstruction. Details have been left for working out when the principles have been accepted. The task has already occupied about twelve months.

The scheme envisaged is a return to the recommendations of the Grigg Report of 1933 supplemented by recommendations of the Cutforth Report of 1936 and the Perry Report of 1940. The Grigg Report recommended the establishment not only of the Milk Marketing Board, but also the appointment of a dairymen's and milk manufacturers' board and a joint milk council. The Cutforth Committee also advocated the establishment of a Permanent Milk Commission as a central authority for the entire industry; and the Perry Committee advocated the establishment of a milk distributive organisation "equipped with all the necessary powers and facilities."

The Central Milk Distributive Committee now suggests that the industry be reorganised under three statutory bodies—namely:

(1) A Milk Industry Council;
(2) A Producers' Board; and
(3) A Distributors' and Manufacturers' Board.

The Council would be responsible for carrying out national milk policy. It would have an independent chairman and vice-chairman; and the four departments mentioned above and also the Producers' and Distributors' Boards would each nominate one member. The Council would fix prices for milk and home-produced milk products at all stages from the producer to the consumer and would allocate supplies of milk for the various purposes. It would also supervise the working of the National and School Milk Schemes and would perform many of the functions (including the primary purchase of all milk) at present carried out by the Ministry of Food.

The Producers' Board, it is suggested, would be responsible for the quality of milk produced, milk recording and testing, the stocking of farms, feeding of herds, and other matters appertaining to production. The Board would retain all its statutory powers except those reserved to the Milk Industry Council.

The Distributors' and Manufacturers' Board would take over the powers of the proposed Milk Products Marketing Board (now in abeyance) and would be responsible for matters concerning both distribution and manufacture.

It is suggested that if the Producers' Board or the Distributors' and Manufacturers' Board should wish to undertake trading, separate commercial undertakings should be established for the purpose, and that these undertakings should conform to the same regulations as other undertakings of the same type. Another suggestion is that costings of producers, distributors and manufacturers should be an important task under the post-war scheme. The Central Milk Distributive Committee would cease to exist under the proposed scheme of reorganisation, which would require legislation before it could be put into operation.

Fat Production by Micro-Organisms

We have already referred to the work of H. Fredholm published in Germany. Since then his paper in *Kungl. Lantbruksakademiens Tidskrift*, Vol. 80, 1941, pp. 341-349 (in Swedish, with English summary), has been received in this country. This paper briefly reviews earlier work on the production of fat by micro-organisms. The methods of isolation, purification, and identification of the *Oospora lactis* strains used in his investigation are described, together with an appropriate method for the microscopic examination of the varieties or species of *Oospora*. Strains that show the best qualities from the point of view of fat production are indicated. The organism is cultivated on autoclaved whey, the temperature being maintained at 28° C. Generally, autolysis begins about the eighth day. The amount of fat reaches its maximum on the fifth or sixth day. Two parts of dry matter with 25 per cent. of fat are obtained from 4·25 parts of lactose+lactic acid when *Oospora* is grown in pure culture.

Very much better results are obtained when *Oospora* is grown in symbiosis with certain bacteria belonging to the family of Lactobacteriaceæ; especially high yields are reached when inoculation with the bacteria is carried out about forty-eight hours after the whey has been inoculated with *Oospora*. 1·8 parts of dry matter containing about 42 per cent. of semi-liquid fat can be obtained from just over 4 parts of lactose+lactic acid, the *p*H of the substrate being 4·1 and the total time of cultivation six days. Since the turnover may be regarded as accomplished in four days, this represents a considerable acceleration of fat production over methods previously known.

Erratum

In the paragraphs headed "The National Loaf" and "Lord Woolton at the Distillery", FOOD MANUFACTURE, August, 1943, p. 249, it was stated that an admixture of 7 per cent. of oats and barley is used for diluting millers' grist. Actually the compulsory minimum of diluents is 10 per cent., and may consist of barley, rye or oats or a mixture of all three.

Young Men in the Food Industry

We have received a note from a Scots correspondent, in which he says that "indicating an intelligent approach to staff selection and training as well as the realisation of the need for present planning for post-war business is the action of a large Scottish food manufacturer who has engaged a number of youths of 17 on his staff." These youths "specially selected from good schools for their high educational attainments and personal attractiveness" have been engaged on the specific condition that they are to be the firm's representatives post-war. They are to be given a thorough training in the commercial, manufacturing and distributive sections of the firm, and it is expected that, when the war ends, "they will start out with all the vim and energy of men specially fitted for the work assigned to them."

We do not know if there is anything particularly novel about the plan, which incidentally demonstrates a pleasingly optimistic estimate of the duration of the present conflict, but it does strike us that there may be, among those "who have left a lot of little things behind them", experienced men who will be only too glad to use for the purposes of earning a living the vim and energy which is at present devoted to their country. We hope they will not find the market saturated when they return.

Potato Glut Anticipated

The Scottish food trade anticipates a glut of early potatoes, which they fear will not be wholly consumed as food, as a result of the delay in clearance of older stock. The Ministry at present contracts with growers for late keeping varieties, but it is suggested that the same end could be easily achieved by arranging that all growers over a certain acreage should keep a certain proportion of their crops for end-of-season sale. This would allow growers to select their own types and relieve the Ministry of the problem of control and surpluses. It is suggested, for instance, that the growing of "earlies" has been so much overdone that the supply is much in excess of demand. Despite this, the potato trade has seen with alarm the continuation of the feeding of canned potatoes to troops in Britain and at least one growing area has sent a strong protest against the supplying of such canned supplies to troops located in the heart of an area which cannot at the same time sell its new potato crop. In such circumstances much of the new crop has been given for stock feeding. The fact that a higher price was conceded for the areas in the North of Scotland has also been a factor which has induced south country growers and merchants to push supplies into the north, thereby defeating the intention of the higher price arrangement, which was primarily intended to encourage north of Scotland producers.

Colour of Canned Peas

A new canning procedure has recently been developed which protects the natural greenness of canned peas during canning so well that the canned peas are actually greener than fresh-cooked ones.

Early attempts to use alkali to counteract the acidity which destroys the green colour have been based on the use of sodium bicarbonate, disodium phosphate and similar reagents. The resulting canned product, although still retaining a certain greenness, was soft and mushy in texture. This softening effect was erroneously attributed to the alkalinity. It has been found that the softening effect is due to the "base exchange" of the sodium constituent rather than, as had been assumed, to the alkaline factor.

The new canning procedure comprises three steps in which the alkalising compounds of sodium, calcium, and magnesium are used successively under closely controlled conditions and in small concentrations. The resulting canned product has a texture closely resembling similar peas canned by the conventional procedure. The chemical evidence indicates that the nutritional value of the peas canned by the new procedure is equal to that of the average conventional product. It is stated that most people who have tasted the new product have found that its flavour is a closer approach to the flavour of fresh cooked peas than can be achieved by the conventional canning procedure.

The process was developed in the laboratories of the American Can Company and formed the subject of papers read before the Agricultural and Food Chemistry Division of the American Chemical Society.

Lye Peeling of Potatoes

A method of peeling potatoes prior to their dehydration is described by Caldwell, Lombard and Culpepper, of the U.S. Bureau of Plant Industry, Soils and Agricultural Engineering, U.S. Department of Agriculture, in an article in *The Canner* of June 19, 1943. In their preliminary experiments the authors used a rectangular steel tank of about 50 gallons as a container for the lye. The tank was heated partly by closed and partly by open steam. The lye solution used was a 10 to 12 per cent. solution of caustic soda maintained at fairly constant concentration by the addition of more lve as it became diluted from the steam. It was held during immersion of the potatoes at a temperature of about 190° F. by running in steam from an open pipe. Potatoes were placed in a large, heavily built, slatted crate which was immersed in the solution and gently agitated from time to time. This treatment being completed, the crate with contents was immediately transferred to a second tank, and the potatoes washed free of the gelatinised peels by

agitation under strong sprays of water. The time required for peeling at the temperature and lye concentration named differed somewhat according to the varieties, but ranged between 7½ and 10 minutes as extremes.

Lye peeling had two advantages over peeling by abrasive machine, in that it reduced percentage of peeling waste and at the same time materially reduced the labour of trimming. Lye gelatinised and removed the periderm and a thin layer of the cortex uniformly over the entire surface regardless of the shape of the tuber, and washing under sprays of water left a smooth, clean surface. The leaf scars and contained buds constituting the eyes were also in very large part removed and in most varieties the hand-trimming necessary was restricted to the removal of cuts and bruises and with a clearing out of a small percentage of imperfectly peeled eyes.

Infection of Butter and Cheese

Whether butter and cheese are not similar to raw milk as a source of infection by the bovine tubercle bacillus is a question that is constantly put. In the course of an article citing a recent epidemic of typhoid fever in Canada, the *B.M.J.* (June 12, 1943) presented a useful summary of the subject. Dealing with the tubercle bacillus, it is stated that its survival in butter and cheese depends mainly on three factors: how heavily the original milk is infected, whether raw or pasteurised milk or cream is used, and how long after preparation the articles are stored before they are eaten. According to the observations of early bacteriologists the time in which tubercle bacilli died out varied from a few days to several months, depending on the degree of the original infection. With regard to butter, most of it, imported or otherwise, was made from pasteurised cream, and only a very small proportion on farms from raw cream. Properly ripened cheese may be said to be safe from infection.

The war has changed things considerably. Cheddar cheese used to be ripened for 5 to 9 months, but now the ripening period has been controlled and, on the whole, shortened. Small quantities of Cheddar cheese may be sold within three months, and practically all Cheshire cheese within one to three months. However, an increased proportion of the cheese consumed is coming from the larger units which usually pasteurise their milk.

The epidemic of typhoid fever in Manitoba was due to the eating of unripened cheese (*Canad. Publ. Health J.*, 1942, **33**, 541). Altogether about 100 people contracted the disease, and the trouble was traced by Dr. M. Bowman, who conducted the investigations, to the infection of the milk and the cheese by carriers of typhoid bacilli and to the sale of the cheese within two or three weeks of its manufacture, a time too short to ensure the destruction even of the typhoid bacillus. Dr. Bowman advised as rigid a supervision of milk for cheese-making as that intended for consumption in the liquid state and the insistence either on pasteurisation of the milk before it enters the cheese or on an adequate ripening of the cheese before it is sold.

New Fruit Growing Research Group

The Scottish Fruitgrowers Research Association is a new organisation formed to carry on research work in the fruit-growing areas of Scotland. The formation of this body follows from continuous and valuable assistance given to research workers by independent growers concerned over their individual problems, and their activities have now been co-ordinated.

One particular success of great importance to jam-makers has been the development of a type of strawberry more resistant to the "red core" disease which has caused considerable loss to fruit-growers in this area. Now known as the Auchencruive variety, the seedlings have been fully tested and are being grown extensively. Released first as an experiment, this variety has now been considerably improved, and breeding and selection of seedlings is being continued to allow the large-scale release of these seedlings to the fruit-growing industry as a whole.

Effects of Reduction of Sugar in Wartime Diets

"The question of sugar reduction quite possibly affects the health of the nation . . . as the more sugar consumed the less bread eaten." Mr. J. Gordon Hay, in a letter to *Milling* (August 7, 1943), points out that our present consumption of sugar is 1·8 ozs. per day, a reduction of 3 ozs. per day or 62 per cent. since 1938. He assumes that this 3 ozs. of sugar carbohydrate is replaced by 3 ozs. of bread and potato carbohydrate, seeing that the required calories are not supplied by an increase in fat intake. Given that this increased bread and potato carbohydrate consumption is equally divided between the two, Mr. Hay calculates that this carbohydrate would have associated with it 126·4 I.U. of vitamin B_1, about one-third of the requisite daily intake, while if consumed as sugar it would have none.

In other words, states Mr. Hay, sugar is a B_1 robber; if the contention that there was a deficiency of B_1 in our pre-war diet was correct, it was our excessive sugar consumption which caused us to take in more carbohydrate than the B_1 supplied by other foods could deal with. He calls upon the "food faddists" to turn their attention to sugar, whereby they might produce some statistics showing that a decrease in disease from faulty carbohydrate metabolism may be due to a fall in sugar consumption.

Dehydration Factory No. 1

A description of a visit to the first of a chain of vegetable dehydration factories to be inaugurated under the auspices of the Ministry of Food.

T. CROSBIE-WALSH, F.I.C.

BORN in the laboratory, reared in the pilot plant (described in FOOD MANUFACTURE, XVII, 8, 217), the first of a chain of fifteen dehydration plants under the auspices of the Ministry of Food has started work in a large food factory in the London area.

Potatoes, cabbages and carrots are the products mainly to be handled, and, with minor but none the less important adaptations, the same plant is used for all.

The Advantages of Dehydration

Much has been written about the virtues of dehydrated vegetables, especially as regards their usefulness as supplies for the armed Forces. The large saving of shipping space resulting from their use as army supplies is obvious. Those neat, lacquered, 10-lb. tins of dried potatoes (for example) already flowing out of the factory each represent 1 cwt. of raw ones. But it is not only the economy of shipping space which renders this dehydration business so important to-day. It is not necessary to go to the factory to be able to realise the amount of work which is by-passed, for it can be seen in any kitchen. The washing, the peeling, the cutting, and the disposal of peelings and dirt are tedious prerequisites of a dish of potatoes. For the moment the domestic consumer will not be spared this preliminary work because all dehydrated vegetables will be reserved for the Forces. Later on, perhaps, we shall see all kinds of dehydrated vegetables in the kitchen, despite the fact that it is not a fertile seed-bed for revolutionary ideas.

Trimming vegetables by the side of a moving belt.

The last stage of all. Tasting reconstituted dehydrated vegetables in the laboratory.

Imagine a far-off foreign beach where stores are being discharged for the use of one of our invading armies. Say that it is quite a small army and that a mere 10 tons of potatoes are being discharged.

From ship to lighter and from lighter to beach 200 clumsy sacks are being conveyed. Some of the sacks have probably split and are cascading their contents into the sea. That is one picture. The other is of 100 fibre-board cases, each not occupying a fifth of the space of one sack, and each containing food which can be ready to eat in the time it takes to boil it.

All by the simple expedient of eliminating the water, and incidentally the inedible waste, from the vegetable, a job tackled quite early in history by sun-drying and other primitive methods, obviously unsuited to the tremendous requirements of modern times.

Dehydration is, however, not so simple as it might appear, as the researches of chemists, biologists and engineers can testify. Factory No. 1 embodies the results of those researches, and the following notes show briefly how it works.

Dehydrated Potatoes

Arriving at the factory, the potatoes are emptied from their sacks into a worm conveyor. Passing along this cylindrical vessel, they rub against each other as well as coming into contact with rotating carborundum rollers, at the same time being sprayed with water. They emerge, clean and roughly peeled, at the rate of 2 tons per hour.

The perforated tins of product being placed in the equipment where air is exhausted and replaced by nitrogen.

Machinery, however, will not remove " eyes " and other irregularities, and the potatoes are carried on a moving belt a little farther on, alongside which ninety women are seated, occupied in finishing the trimming process by hand.

On another belt, running alongside, proceed the clean potatoes, arriving at a junction. They have now one of two destinations, according to the immediate requirements of the flow of operations. They may either be conveyed to a storage tank to await their turn for subsequent operations, or be sent directly to the machine which cuts them into strips.

In the storage tank the potatoes are immersed in water containing a small amount of sodium sulphite, and from this tank they are " flumed ", when required, to the stripping machine.

The potatoes, whether from the storage tank or direct from the trimming belt, now enter the stripping machine. This is a rotating cylinder which by centrifugal action conveys the potatoes to a knife and forces them through the cutters, from whence, now in the form of thin strips, they go into the washing machine.

The washing of the strips, which is effected by water sprays, is an important item. During the cutting operation starch cells are ruptured. The starch thus liberated would have an adverse effect later on, as it would gel and make the potato strips stick to the trays during the drying operation.

Blanching the Potatoes

The next operation is one the adoption of which has placed the dehydration of vegetables on a new footing. Commonly called blanching, it consists of heating strips of vegetables sufficient to destroy the enzymes which, among other things, turn the potatoes nearly black. The process must not be so prolonged as to cook the potatoes nor so short as to leave any enzymes intact.

Blanching is done in a perforated rotating cylinder which dips into an outer half-cylinder. This half-cylinder contains water, in which is dissolved a small quantity of sodium sulphite. The water is heated by open steam almost to boiling point, and automatic control keeps the temperature to the required point. The potato strips are impelled along the cylinder by means of a scroll and emerge on to a moving belt.

The hot strips must be rapidly cooled in order to avoid the possibility of the setting in of fermentation. The strips, carried along a wire mesh band, are subjected to a cold-air blast, directed from above and below to ensure rapidity of cooling. From the cooler the potatoes are conveyed to a hopper, which delivers them to the drying trays, over which they are spread in a layer ½ inch thick. The product is now ready for the drying operation.

The Tunnel Drier

Into the brick-built drier are wheeled the trolleys loaded with trays over which the material has been spread. The drier consists of two tunnels in parallel—one a wet tunnel in which the greater proportion of the water is removed and the other a dry tunnel in which the product is taken through the final stages of drying.

The air-flow in these tunnels is opposite to the movement of the trucks—*i.e.*, the counter-current system of air circulation is employed. The trolleys are carried through the tunnel by ram-pusher gear.

The temperature of the wet section is maintained at approximately 200° F., while that of the dry tunnel is 145°-150° F.

Packaging the Product

The dried potatoes are filled by hand into 4-gallon tins. The possibility of using mechanical means for this purpose has not been overlooked, but it is considered that at the present rate of production it would not be warranted.

The empty tins are received in a lacquered state except for the space occupied by the seams, the object of this being to paint the tins after filling and closing with bituminous lacquer, which would have a tendency to reseal any leaks that might be produced during handling and transport subsequent to their departure from the factory.

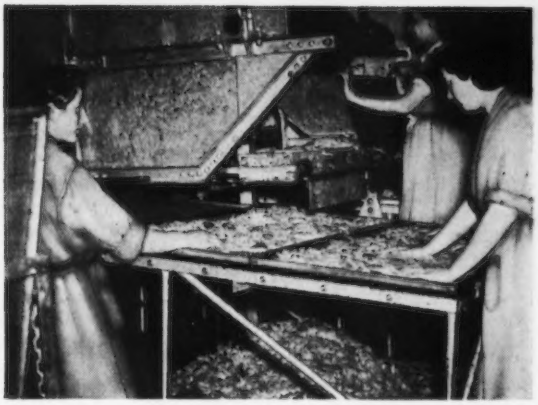
The tins are first fitted with press-in lids. A tagger plate is then placed over the lid and soldered on, soldering being carried out by means of an electric soldering iron.

Filling Tins with Nitrogen

The next stage is a replacement of atmospheric air with nitrogen, which is one of the outstanding means of preserving the quality of the vegetable. The tin, previously perforated in two places, is loaded into a metal chamber of rectangular shape capable of holding four tins. The chamber is then exhausted by means of a vacuum pump to a pressure of 4 mm. of mercury.

(*Continued on page* 310)

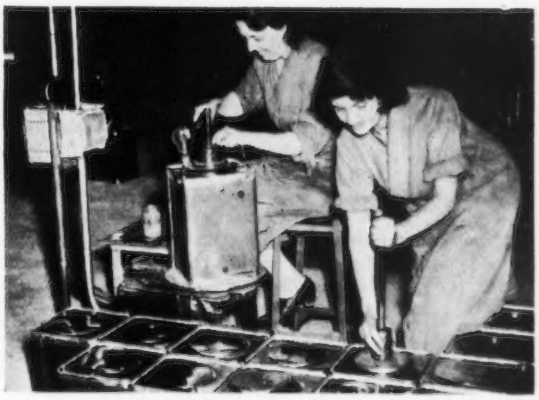
Cabbages being sorted and cored. The operative on the left is working the coring machine.



As the vegetables come out of the cooling machine they are spread on trays ready for the drying process.

Loading a truck with trays of vegetables in readiness for the drying operation.

Filling the dehydrated vegetables into tins and adjusting weight.



The tins are first fitted with a press-in lid, then hermetically sealed with a soldered-on tagger-plate.

A tin being tested by passing gas through a perforation and immersing the tin in water. Bubbles indicate leaks.

The Deterioration of Molasses in Storage

WILLIAM L. OWEN

UNDER normal conditions interest in the changes in the composition of blackstrap during storage is largely confined to distillers of molasses, whose experience has convinced them that over long periods of storage there is a slow but certain decrease in total sugars in blackstrap, and that old molasses is more difficult to ferment efficiently than that from a new crop. Under the present conditions it would seem that the most important phase of this problem is how to salvage the enormous volumes of impounded blackstrap which as a result of overtaxed storage conditions must either be stored in improvised facilities or diverted to waste.

Nature of Deterioration

The deterioration of blackstrap may be placed in the following categories: (1) bacteriological; (2) biochemical; and (3) chemical. The first may be further subdivided into (*a*) changes produced by mould fungi; (*b*) changes produced by bacteria; and (*c*) changes produced by yeast.

At normal densities blackstrap is practically immune from the deteriorative action of bacteria, as their maximum limits for growth are considerably below the concentration represented by any molasses. Stratification of solids in blackstrap is always operative in stored molasses, but even at its maximum the activity of bacteria would be excluded from consideration. Surface absorption of moisture would tend to provide a substrate more suitable for bacterial growth, but even here the author has never been able to observe any measurable increase in the bacterial population. The mould fungi can adapt themselves to limits of density not far below that of blackstrap molasses as is abundantly demonstrated in the deterioration of raw sugars when the factor of safety rises above 0·250, which connotes a ratio of non-sugar to moisture and hence a density identical with that of a low purity molasses. Taking into consideration the absorption of moisture on the surface film of blackstrap, some deterioration from the activities of mould fungi may always be expected, as regards sucrose losses at least.

The activities of the saccharomycetes are not entirely suppressd by the densities of commercial blackstraps, and some slow fermentation by torulæ or pseudo-yeasts occurs normally in these products. This fermentation is largely at the expense of the hexose sugars, but Browne, who has made the most comprehensive investigations of the deterioration of blackstraps in storage, has observed that these changes over long periods of storage are characterised by a loss of sucrose as well as of invert sugars.

There is some evidence that extracellular enzymes may be responsible for an indeterminate amount of inversion of sucrose in blackstrap during long periods of storage and the author once investigated a case where the purity of a refiner's molasses had undergone a very rapid deterioration, which could not be explained either by bacteriological analysis or by evidence of spontaneous decomposition. It might easily be conceived that sufficient invertase might be released by mould fungi to have induced inversion under conditions that did not permit of the further development of the organism from which it was derived.

Abstract of paper read before the Division of Sugar Chemistry and Technology of the American Chemical Society, April, 1943.

Chemical Changes

Chemical changes are believed to be operative in almost all blackstraps, and may vary in intensity from the almost imperceptible evolution of gas to the intense foaming and frothing sometimes observed in sugar factories, and always experienced in some degree in the canning of even high-grade molasses. Browne has observed that these changes may progress over a period of years to the complete combustion of the sugars originally present and to a charring of the molasses in which they occur. More recently Hucker and Brooks have published significant data on the factors conducing to these spontaneous changes, generally known as frothing or foaming of blackstraps.

Under the limited facilities now available for properly storing the large volumes of blackstraps accumulating in Cuba and Puerto Rico particularly, the question arises as to the minimum safeguards required for salvaging this valuable raw material.

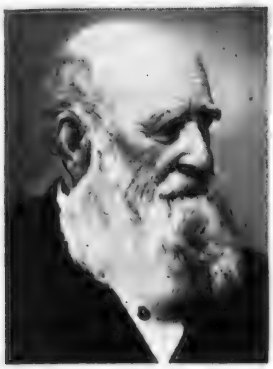
Earthen Reservoirs

In the previous World War a considerable volume of blackstrap was impounded in earthen reservoirs for long periods of time, and the percentage of loss incurred was much lower than had been anticipated. At that time it was supposed that the bacteriological changes in blackstrap were more costly in sugars and hence that the dangers involved in the reinfection of molasses stored in reservoirs of the above type would make such methods of storage prohibitively expensive as a result of sugar losses. The results of these attempts at storage improvisations were far less disastrous than had been predicted, and the sugar losses were far less than had been anticipated. Surface dilution had occurred and had resulted in microbial development and sugar destruction, but net losses were less than had been anticipated. Furthermore, there was less evidence of foaming as a result of spontaneous decomposition of the lower layers of the blackstrap than was usual under the normal conditions of storage in tanks, owing to the lower temperatures that existed in these reservoirs.

Now that we know more of the causes of molasses deterioration, some similar improvisation of blackstrap storage might successfully be effected.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.



Sir J. Henry Gilbert

Rothamsted, 1843-1943

This year marks the centenary of Rothamsted, one of our oldest research stations, which from small beginnings has grown until its fame spreads round the world. It was, on July 21, celebrated by a brilliant and successful function described by the Minister of Agriculture as unique in the history of British agriculture.

Sir J. Bennet Lawes, Bt.

THOUGH not the first centre to be founded for the experimental study of animal and plant nutrition, Rothamsted Experimental Station at Harpenden, in Hertfordshire, is easily the oldest and certainly the most famous of existing centres of agricultural research. In the thirties of last century a farm at Bechelbronn in Alsace was devoted to agricultural experiments under the direction of the French chemist J. B. Boussingault, but this purpose was given up after a few years.

It has been plausibly stated that the Rothamsted Station owes its inception to the bad guess of a German chemist—the celebrated Liebig. It is not certainly known whether it was directly due to a desire to show that Liebig was wrong that Mr. (later Sir) John Bennet Lawes started the experiments that were to have world-wide fame; nor can the commencement of Lawes' experiments be accurately dated.

Lawes was the son of a man whose only distinctions were social, and who entertained royally in more senses than one in his manor house of Rothamsted. There is a story that the younger man frightened his mother by performing chemical operations in a bedroom of the manor. John Bennet Lawes inherited the manor and surrounding lands and a seriously reduced patrimony, and continued his experiments in an old barn belonging to the estate. It was there, about 1841, that he discovered the possibility of making rock phosphate readily available to plants by treating it with oil of vitriol, and thereby founded not only a remunerative business (sold in 1872 for £300,000) but also the world's superphosphate industry.

In 1843 Lawes began the series of experiments which have become so celebrated. In that year he laid out two fields into plots to try the effect of various chemical substances or "artificial manures" upon the growth of plants. Broadbalk field, devoted to wheat, has been continued in very much the same arrangement and continuously with the same crop every year without intermission, so that it has this year borne its 100th successive crop of wheat. One of the plots has had no manure or addition of any kind since

A Message to "Food Manufacture" and its readers from Sir John Russell

The Rothamsted Staff send greetings to Food Manufacture *and its readers on the occasion of its Centenary Commemoration. For a hundred years agricultural experiments have been carried out here with the view of gaining the knowledge that would help farmers to increase the quantity and quality of their output. But this represents only part of the problem, for when the produce leaves the farm much of it still has to be further worked up before it becomes good food. How often have we had occasion to feel that this part of the work had not been well done! It is because* Food Manufacture *sets out to raise the standards of the post-farm treatments that we are interested in the activities of its readers.*

E. JOHN RUSSELL

The retiring and new directors of Rothamsted : Sir John Russell and Dr. W. G. Ogg.

1839. For many years this unmanured plot has remained at a substantially stable level of yield of about 15 bushels per acre—an average which exceeds that of any of the principal wheat-exporting countries.

As Lawes continued and extended his experiments he established the value of the new " artificials " and especially the value of nitrogenous fertilisers for cereal crops. This was something more than a practical gain, for Lawes was laying the foundations of a new science : plant physiology. Nowadays many are inclined to forget that " what everybody knows " about the availability of plant nutrients had to be discovered by somebody; in many instances that somebody was Lawes (aided by his chemist coadjutor Henry Gilbert). It is a striking fact that although Lawes was commercially concerned with phosphatic manures (in the business of which he was clearly successful) there is no suggestion in any of his writings or recorded speeches of using the Rothamsted results to " push " superphosphate; he used " super." in the same manner as he used potassic or other manures in which he had no financial interest.

Liebig maintained that plants, and especially cereals, could get from the atmosphere all the nitrogen they required. As we all know now, Liebig was wrong : and it was Lawes and Gilbert who showed how wrong.

Some of Liebig's letters formed part of an exhibition of documents at the Rothamsted Experimental Station Centenary celebrations held on July 21. Here is an extract from one of them, written in 1864, by which time the lessons of Broadbalk were patent, so that Liebig *should* have been less assertive :

> The theory of manuring is very little understood in England and this by the so-called practical teaching of Mr. Lawes and his associate. The best advice you could give to the respectable but very ignorant gentleman who grows wheat every year . . . is to continue, if he wants a proof of the truth of my theory.

To continue has been just what Rothamsted has done, and for a length of time and with results far exceeding anything envisaged in the sixties. The " classical " fields of Lawes have been used as sources of information about entomology, bacteriology, and other sciences in ways not thought of when these fields were laid out from 1943 onwards. They have done more than disprove what Liebig wrote from Munich.

The classical field experiments at Rothamsted are the easiest to demonstrate to visitors and to write about, and have naturally received the fullest publicity. It would, however, be very wrong to think that the continuance of interesting museum-pieces has been the sole or even the chief concern of Rothamsted this century. Fresh life was infused into the work by the

Sir John Russell explains the famous Broadbalk field bearing its hundredth crop of wheat. From left to right in the front row are : The Rt. Hon. R. S. Hudson, Earl Radnor, Dr. W. G. Ogg, and Lord Bledisloe.

late Sir Daniel Hall when he became Director in 1902. He increased the scope of the researches by adding new sciences, and was succeeded in the expanding work by Dr. (now Sir) E. John Russell in 1912. During the last war the activities of Rothamsted and the advice of Sir John were of great importance for the food campaign.

Some Modern Research

Under Sir John Russell the Station has greatly increased the range of its researches, several new departments having been founded. Rothamsted was the first agricultural experiment station to develop the physics of soil, with which the name of Dr. B. A. Keen will always be associated. Rothamsted techniques for investigating the stickiness of clays have been profitably applied to problems of the plasticity or flow of dough and honey, and the firmness of butter, cheese, etc., at different stages of making or storage. This provides one more instance of the fact that good research proves to yield far wider results than that for which it is initially designed. The work on bees has been in a quite different context of fertility. Bees are important as producers of honey, but they are perhaps more important as pollinators of fruit trees. Recently, Rothamsted has been active in research intended to maintain the health of bee colonies and has stressed the need of care in the use of arsenical sprays on fruit trees in blossom.

Two Fundamental Contributions

It has been suggested that no experimental centre can hope to obtain another " scoop " of the magnitude of Lawes' discovery of superphosphate. This may be true so far as purely practical or technical aspects are concerned, but in quite recent years there has arisen, unpublicised, and unnoted by the general public, a new form of science which may well sweep the world. This consists of modern methods of mathematical statistics, discovered at Rothamsted by Dr. R. A. Fisher and his colleagues in the Statistical Department founded in 1919 at the instigation of Sir John Russell. These methods. it is needful to say, have nothing in common with the usual meaning of " statistics " as masses of unrelated figures. The new methods supply the means of finding the significance of observational results. They have transformed the meaning of " experiment " to such an extent as to have become the standard throughout the English-speaking countries (including India) and have begun to take hold in Sweden and China. The philosophic as well as social potentialities of these new methods is immense, since they can be used to investigate any figures whether arising from experiments or not. Thus, a few progressive people are using them to extend bookkeeping analyses; and the new methods can be used—if the politicians allow —to examine vexed economic matters such as will accompany the peace.

It may be that someone writing in 2043 will say of Rothamsted's two centuries: "The nineteenth, 'super.' and artificial manures; the twentieth, the birth of a new philosophy." It will be consonant with the widening of civilisation from the empirical to the technical if the opinionative evolves into a type of society based on modern objective methods of science. In any case, Rothamsted will have no reason to be ashamed of having "continued ".

Hail and Farewell

At the Centenary lunch the Minister of Agriculture said that a unique and historic occasion in the history of British agriculture was being celebrated. Sir John Russell paid several tributes to his staff—not the least to the Assistant Staff of young people to whom falls " an enormous amount of laborious detailed finicky work to be done over and over again. . . . Agricultural science all over the world owes a great debt to them." He pointed out that Rothamsted could maintain its high position only by giving scientific workers something more than good laboratories: " the freedom of thought and action which will allow them to develop their subject in whatever direction the experimental results may lead."

As Sir John retires on September 30, the Centenary was both his triumph and his valedictory. He gracefully welcomed Dr. W. G. Ogg, who will direct the Station through the next interesting but probably troublous years. Dr. Ogg is at present Director of the Macaulay Institute for Soil Research at Aberdeen. He is perhaps the most valuable " export " that Aberdeen or Scotland has given to England for a long time. One of the main features of the work of that Institute has been the demonstration that peaty wastes such as those on the Island of Lewis can be converted into productive farm land.

Chemical Executive's *Vade mecum*

THE scheme of improvement, enlargement and rearrangement which was initiated with the 1942 edition has been carried considerably further in the seventeenth edition of this well-known work.*

In accordance with the general plan, the book has been divided into ten sections, made up of twenty-four sub-sections.

The glossary of industrial chemicals, first published in the 1942 edition, has been extended and incorporates the latest chemical developments.

Other new features include glossaries of metals and alloys, with numerous tables dealing with metals and other structural materials, chemical plant and instruments. The newly compiled glossaries of pharmaceuticals and the raw materials of perfumery (now including synthetics) replace the less comprehensive glossaries in the 1942 edition.

The tables of physico-chemical constants have been revised and enlarged, and the data of organic and inorganic compounds have been entirely rewritten and augmented.

The index to technical data now lists no less than 4,500 references and cross-references, and the data of organic and inorganic chemicals run to 2,000.

This is a work which the busy chemical executive can ill afford to be without. It is a veritable library compressed between two covers.

* *Chemical Industries.* London: Leonard Hill Limited. Pp. xxiv+360. 15s. net.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, August 1, page 270.

No.	*Date.* 1943.	PRICE FIXATION ORDERS
512	Apr. 1.	Revoking Directions Supplementary to the Potatoes (1942 Crop) (Control and Prices) (No. 2) Order, 1942. Revokes S.R. & O. 1943 No 44.
515	,, 2.	Prescribing an Appointed Day for the purposes of the Rhubarb (Maximum Prices) Order, 1942.
534	,, 7.	Amending the Biscuits (Maximum Retail Prices) Order, 1942.
545	,, 8.	Cereal Fillers (Control and Maximum Prices) Order.
558	,, 10.	Amending the Fish (Maximum Prices) Order, 1943.
566	,, 12.	General Licence under the Potatoes (1942 Crop) (Control and Prices) (No. 2) Order, 1942. See General.
567	,, 13.	Home Grown Tomatoes (Control and Maximum Prices) Order.
576	,, 13.	General Licence under the Bread (Control and Maximum Prices) Order, 1943.
577	,, 13.	Amending the Chocolate and Chocolate Confectionery (Maximum Prices) Order, 1941.
578	,, 13.	Amending the Sugar Confectionery (Maximum Prices) Order, 1941.
629	,, 23.	Amending the Cereal Fillers (Control and Maximum Prices) Order, 1943.
631	,, 24.	Shell Fish (Maximum Prices).
633	,, 24.	Amending the Green Vegetables (Maximum Prices) Order, 1942.
641	,, 28.	Meat (Maximum Retail Prices) (Northern Ireland) Order. Revokes S.R. & O. 1940 Nos. 46 and 339; 1941 Nos. 13 and 1206; 1942 No. 1648.
652	,, 29.	Potatoes (1943 Crop) (Control and Prices) Order.
653	,, 29.	Amending the Feeding Stuffs (Maximum Prices) Order, 1942.
		FEEDING STUFFS
680	May 6.	Infestation (Feeding Stuffs). Revokes S.R. & O. 1940 No. 2069 and 1941 No. 1993.
687	,, 8.	Order, amending the Feeding Stuffs (Regulation of Manufacture) Order, 1942.
709	,, 14.	Directions, supplementary to the Feeding Stuffs (Rationing Order, 1942), and amending the Directions, January 15, 1943, under that Order.
		FISH
539	Apr. 7.	Fish Sales (Charges). [Emergency Powers (Defence) Act, 1939. S.2.] Revokes S.R. & O. 1942 No. 2032.
546	Apr. 8.	Fish (Distribution). Revokes S.R. & O. 1942 No. 1982.
565	,, 10.	Fish Sales (Charges) (Amendment). [Emergency Powers (Defence) Act, 1939. S.2.]
695	May 11.	Fish Boxes (Returns) Order.
		MILK
630	Apr. 23.	Directions, supplementary to the Milk (Control of Supplies) Order, 1942, and the Milk (Control of Supplies) (Scotland) Order, 1942. Revokes S.R. & O. 1943 No. 405.
664	May 1.	Directions, supplementary to the Milk (Control of Supplies) Order, 1942, and the Milk (Control of Supplies) (Scotland) Order, 1942. Revokes S.R. & O. 1943 No. 630.
705	,, 13.	Order, amending the Milk (Scheme of Supply) Order, 1942.
Provisional.	May 21.	Milk and Dairies, England. Provisional Regulations.
Draft.	May 14.	(Dried and Condensed Milk) Regulations, 1943.
		POINTS RATIONING
663	May 1.	Order, amending the Food (Points Rationing) Order, 1943.
		RATIONING
640	Apr. 28.	Amending the Cheese (Rationing) Order, 1942.
659	,, 30.	Amending the Rationing (General Provisions) Order, 1942.
		SOYA BEANS
517	Apr. 3.	Soya Beans (Control) Order.
		STARCH AND DEXTRINE
608	Apr. 16.	Starch and Dextrine (Control) Order. Revokes S.R. & O. 1941 No. 1991 and 1942 No. 788.
		TRANSPORT
538	Apr. 7.	Potatoes (Amendment) Direction.
547	,, 8.	Directions. Revokes S.R. & O. 1942 No. 1983.
658	,, 30.	Tomatoes. Directions. Revokes S.R. & O. 1942 No. 948.
		VEGETABLES
506	Mar. 31.	Order, revoking the Canned Vegetables (Prohibition of Retail Sales) Order, 1942.

Nutrition in Infancy

The responsibilities of the manufacturer of infant foods are arduous, since the fitness of the rising generation will be vitally affected by the quality of his products. This review of a discussion by leading pædiatricians and food experts should enable manufacturers to study the scientific aspects of the subject.

AFTER nine months of "parasitic" growth in its mother's womb, the newly-born infant is confronted suddenly with the necessity of breathing and eating for itself. The commencement of respiration is usually spontaneous and automatic. Under modern conditions of life, however, the first intimate collaboration between mother and child in contriving effective lactation is often more difficult, and artificial feeding is regarded as a commonplace occurrence rather than an abnormality. This problem and others involved in the feeding of infants were discussed by leading pædiatricians and food experts at a meeting of the Nutrition Society.

Breast Feeding

Success in lactation clearly depends on both physiological and psychological factors. Undoubtedly the state of nutrition of the mother, which will be determined not only by the foodstuffs available in the shops, but by appetite, personal tastes, financial resources and culinary skill, will have a vital influence in deciding whether she will be able to suckle her baby. At the same time it must be recognised that many other factors are involved. Thus in the lower animals the desire of the mother to feed her young is no less instinctive than was her acquiescence to the male during mating. Lactation, indeed, may be regarded as the last stage of the sexual phenomenon which should be associated in the mother with pleasurable physical and mental stimulation. According to Dr. Spence, of Newcastle, much harm may be done to the mother's attitude towards her responsibilities by male doctors, unmarried nurses, welfare workers and others who have never themselves had to suckle a baby. Excessive preparation of the nipples during the last stages of pregnancy, undue regimentation of the times and duration of lactation, and excessive test-weighing of the baby before and after feeding may create the wrong atmosphere for a sensitive or anxious subject.

Apart from the fundamental psychological motive the willingness of the mother to continue lactation may be strongly influenced by practical and economical considerations. Breast feeding has the advantage of cheapness. The milk is ready when wanted, and the meal involves no cooking nor the sterilisation of utensils. On the other hand, artificial feeding allows the mother to be parted from her infant, which under present conditions may be desirable for reasons of employment. The risk of discomfort through sore nipples is minimised, and the figure returns more rapidly to the dimensions of the garments worn before pregnancy. Whatever decision may be taken in the case of a strong, full-term infant, however, there is no doubt as to the benefit which breast feeding affords to weaker infants. Data which have been collected on the subsequent history of premature babies have shown that the rate of mortality in early years is much less in those that have been fed at the breast than in those which have been fed artificially.

Nutrition During Lactation

As far as the health of the child is concerned, therefore, breast feeding, if adequate, has obvious advantages. It must be realised, however, that lactation imposes a serious drain on the resources of the mother. In experimental animals it is well known that diets, capable of maintaining at least an outward appearance of normal health before mating, may be incapable of supporting the additional strains of reproduction. While the termination of pregnancy before full term may be brought about by deficiency of comparatively few nutrients, notably vitamins A and E, almost any dietary insufficiency will result in the production of weak, under-sized young. In the failure in lactation which inevitably ensues the mother will usually neglect or destroy her litter. In the human mother the old adage "a tooth for a child" will hold good unless the mother consumes, over and above her normal ration, a supply of nutrients equivalent to those secreted in her milk. This necessity has long been recognised in feeding dairy cows, which are given a fixed maintenance ration together with a variable allowance which depends on the amount of milk yielded. The wise policy of the Ministry of Food in allowing extra milk and eggs to be consumed either by the mother if lactating, or by her artificially fed baby, is a recognition of the same principle. Cocoa and the various proprietary beverages may play a useful rôle in rendering milk more palatable to mothers who are disinclined to drink sufficient quantities in the natural state.

THE NUTRITIONAL REQUIREMENTS IN INFANCY

Calories

As might be expected from the rapid rate of growth the amount of food consumed per unit of body weight is much greater in infancy than in adult life. According to the American workers Holt and Fales a newborn infant requires 55 Calories per lb. of body weight, which may be reduced to 45 Calories at the end of the first year. The corresponding allowances for a ten-stone adult would be 7,700 and 6,300 Calories, which may be compared with the usual estimate of 3,000 Calories for subjects performing work of moderate severity. An important point, which should be remembered both in checking the efficiency of breast feeding and in adjusting the amounts of food necessary in artificial feeding, arises in supervising the nutrition of thin and premature babies. At first sight it might appear that their Calorie allowance should be adjusted in proportion to their small size. It must be realised,

however, that the thin baby, having little of its weight in the form of inert fat deposits, has the skeleton, musculature and organs of a fatter child of much higher body weight. These are the parts of the body which need feeding, and the Calorie intake must be increased to as much as 75 Calories per lb. if the infant is to attain a normal rate of growth. To facilitate feeding at the right level manufacturers should ensure that the necessary scales for normal and undersized babies are clearly stated. A suitable implement for measuring out the foodstuff should be provided, with emphasis that it will be accurate only if used with the particular brand of food for which it is intended. Dr. Helen Mackay recommends the useful plan of making up artificial foods at the concentration of 20 Calories per fluid oz., which is that found in human milk. The intake can then be plainly gauged from the volume consumed.

Water

The demand of the infant for water is also very high. Thus a 10-lb. baby requires about 25 fluid ozs. per day, most of which will be supplied as milk. This allowance is equivalent to about 17½ pints per day in the 10-stone adult, which does much to explain the inevitable wetness of young babies. Most infants appreciate more water than that taken as milk, particularly in hot weather, and may protest at being given milk or sloppy farinaceous food when crying merely to indicate that they are thirsty.

Protein

The Food and Nutrition Board of the U.S.A. National Research Council has assessed the protein requirement of children under one year at from 1·4 to 1·8 g. per lb. of body weight. On this basis 15 per cent of the calorific intake would be supplied in this form. Since in breast feeding only 7-10 per cent. of the calorific intake is supplied as protein the American recommendation can obviously only be applied to cows' milk, in which the protein must have lower biological value for the infant than human protein. Excess of protein, according to Dr. J. V. C. Braithwaite, may cause injury by giving rise to excessive putrefactive action in the intestinal contents, which may be cured by restoring the correct balance by giving malt sugar. Conversely deficiency of protein, with a corresponding excess of sugar, may cause undue acidity, with excessive formation of gas and diarrhœa. The symptoms in this case should respond to treatment with a diet of butter-milk, which is rich in protein.

Calcium and Vitamin D

The requirement for calcium is difficult to assess. Its utilisation will be influenced favourably by vitamin D in the diet, or its equivalent in the exposure of the body to sunshine, and adversely by cereal products and vegetables which contain phytic acid, oxalic acid, and other agents which cause wastage through the formation of insoluble precipitates. The allowance of 1 g. daily recommended by the American authorities seems very liberal, and much above the level reached in breast feeding. Since the bones at birth are more compact than during the first three or four months of postnatal life they may afford reserve supplies of calcium during this period. It is even more difficult to give a representative figure for the requirement of vitamin D. Babies who are adequately exposed to bright sunshine all the year round will not develop rickets even if their diet is devoid of vitamin D. On the other hand, under adverse conditions particularly conducive to rickets it may be desirable to give as much as 12,000 I.U. daily, although with massive doses precautions must be taken against toxic effects associated with an excessive level of calcium in the blood. Somewhere between these extreme figures we must arrive at a suitable allowance to prevent rickets in healthy infants, enjoying only the scanty exposure to sunlight usually possible in our climate. The British Paediatric Association has approved doses of 700 I.U. daily for full-term babies, and 1,400 I.U. for premature babies, the vitamin being given as cod-liver oil compound. In this form, however, the amount of oil necessary may be inconveniently large, and preparations of synthetic calciferol have a great advantage in this direction. Mixtures of cod-liver oil with malt have usually very low anti-rachitic value, due to the great dilution of the oil and probably to the instability of the vitamin in this medium. If malted preparations must be used a richer source of vitamin D than cod-liver oil should be incorporated, and adequate precautions taken as to its stability, otherwise the assumption of security against rickets may be quite unjustified. No danger of deficiency of phosphorus is to be expected in diets ordinarily given to infants.

Vitamin A

The requirement of the human infant for vitamin A, calculated by analogy from data obtained by Guilbert for various animals, works out at between 450 and 1,350 I.U. daily for a 10-lb. baby. Although less problematical than in the case of vitamin D, this estimate is again only approximate. It is clear, however, from experiments by Moore and others that the vitamin A reserves of the new-born infant are usually very low, and are built up, in a typical case, to about 20,000 I.U. in seven months. The amount of vitamin consumed must presumably be several times greater than the amount stored, both in natural and artificial feeding. At the height of lactation the human mother may secrete in her milk almost 2,000 I.U. daily, which may be compared with the accepted daily adult requirement of 3,000 I.U. The drain on the maternal resources is severe, and will make serious inroads into the typical liver reserve of about 300,000 units unless the diet is such as to allow adequate replenishment. The mother should therefore be encouraged to take her full share of dairy products, which contain preformed vitamin A, and also plenty of green and yellow vegetables, which contain the pigment carotene from which the vitamin is made in the animal organism.

Water-Soluble Vitamins

In regard to this large group of vitamins the greatest interest has been focused on vitamin C, or ascorbic acid, since scurvy is only slightly less prominent than rickets as an obvious sign of nutritional deficiency in infancy. The allowance of 30 mg. daily advocated by the American board is contained in about 2 ozs. of orange juice. For various reasons, including stability, it is desirable that this vitamin should be given separately to the infant, either as fruit or vegetable juice, or as the pure synthetic preparation, and should not be mixed with the other components of the diet. Data on

the requirements of babies for vitamin B_1, riboflavin and nicotinic acid are scanty, but the American authorities recommend daily allowances of 0·4 mg., 0·6 mg., and 4 mg. respectively.

Iron

The problem of the iron requirement in infancy is both interesting and perplexing at its present stage of development. The young baby receives only small amounts of this element in milk, but is able to draw upon reserves which are present in the liver at the time of birth, and to derive further small supplies by the degradation of the superfluity of blood corpuscles which exists at this stage. Nevertheless a subnormal hæmoglobin level, which can be corrected by giving iron, often prevails during the first year of life. Iron is present in green vegetables, eggs and meat, particularly liver. The 6 mg. of iron, as present in natural foodstuffs, which is recommended in America as the allowance for infants, cannot, however, be relied upon always to prevent nutritional anæmia. As with calcium the efficiency of absorption is affected by other food constituents. Thus McCance and Widdowson have shown that phytic acid inhibits the utilisation of the iron of wheatmeal bread. Except in regard to liver, the value of which as an anti-anæmic agent is undisputed, differences of opinion exist between authorities as to the relative value of animal and vegetable foodstuffs as sources of "available" iron. According to Dr. Helen Mackay there is obviously some unknown factor concerned in the metabolism of iron. Until its significance has been appreciated it would seem a sound policy to play for safety by the administration of inorganic iron at the rate of 25 mg. daily. Care must be taken, however, against the indiscriminate addition of iron salts to baby foods, since danger exists of the destruction of other nutrients, particularly vitamins, during storage. The reproductive vitamin E, about which we know so much in the experimental animal, and as yet so little in the human subject, is known to be sensitive to iron salts.

Artificial Feeding

Both short-term policy, which relates to digestibility, and long-term policy, which relates to nutritive value, must be considered in planning successful artificial feeding. In the early stages digestibility is supremely important. Foods which are defective in nutritive value, such as sweetened condensed skimmed milk, may at times serve their purpose in supporting a delicate baby until his digestion will stand up to a richer diet. A case has even been reported of an infant partial only to ice cream, whose life was saved by making this commodity his sole diet as a temporary emergency measure. But prolonged use of defective foodstuffs, however digestible they may be, will lead to illness. Quantitative insufficiency, probably the most common defect, will result from lack of palatability or excessive dilution of the food, and cause poor growth, air swallowing, and an unhappy fretful child. Anæmia, due to deficiency of iron, is probably the next most frequent abnormality, followed in order of incidence by rickets and scurvy.

In regulating diets so as to be suitable for infants we must keep in mind the relative compositions of human milk, and of cow's milk, its most common substitute. The constituents per pint are approximately as follows: Calories 390 for human milk and 380 for cow's milk protein 7·1 and 18 g., fat 19·9 g. in each case, lactose 38·6 and 27·3 g., calcium 200 and 700 mg., iron 1,100 and 400 mg., vitamin A 770 and 790 I.U., vitamin D 14-100 and 0-57 I.U., vitamin C 7-62 and 2-16 mg., vitamin B_1 0·09 and 0·2-0·4 mg., riboflavin 0·08-0·1 and 0·4-1·7 mg., and nicotinic acid >0·6 and 0·6-1·8 mg. It will be noted that both milks are of about the same strength as sources of Calories, but that the distribution of Calories between the constituents is widely different. The main difference lies in the balance between protein and lactose, the former being high in the cow and the latter in the human. The old process of "humanising" cow's milk by dilution, which reduces the protein, followed by the addition of cream, to restore the fat content, and of sugar to represent additional lactose, will be readily understood, although the mixture so obtained cannot be considered as equal to human milk in view of the inferiority of its protein in regard to quality. Other important differences are in calcium, vitamin B_1, riboflavin and nicotinic acid, in which cow's milk is much richer than human, and in iron and ascorbic acid, which are more plentiful in human than in cow's milk. Provided that it is supplemented with ascorbic acid and iron, full cow's milk must rank above human milk as a "protective" or "body building" food, but in individual cases may have the disadvantage of inferior digestibility.

The Introduction to Solid Foods

According to modern methods the infant should be encouraged as soon as possible to supplement its milky basal diet with small amounts of "table" foods, including vegetables, meat, fish and eggs. These will usually be accepted in small amounts at an age of five or six months. Digestive disturbance at this age is much less to be feared than an obstinate refusal to accept solid food if it is withheld until the child is ten or twelve months old. Remarkable observations on this point have been made in experiments in America by Dr. Clara Davies. Healthy infants who had been reared to the age of six months at the breast were given at weaning a free choice of a wide range of foods to be picked up and eaten at will. The subjects varied widely in their tastes, and in some cases continued to thrive on diets which appear absurdly ill-balanced in relation to customary dietary habits. Thus individual infants were known to eat ten eggs or seven helpings of potato at one sitting, or to make their whole meal of raw chopped cabbage. Milk was omitted by one child for months without obvious ill effects. It may be argued, of course, that the children could have been fed as well, and much more economically, if they had been given a carefully planned diet including all the foodstuffs offered combined in their most suitable proportions. One of the conclusions from the experiment, in fact, might be that the child, as has been found by Harris and by Kon with the rat, is unable to compound the best possible diet when offered a choice of the various components separately. At the same time it is clear that the ability to tolerate "table" foods is acquired at an early age, and that undue exactitude in adhering to a diet which has been planned in minute detail is quite unnecessary.

Manufactured Products

The responsibilities of the manufacturer of infant foods are arduous, since the fitness of the rising generation will be vitally affected by the quality of his products. It must be realised that the volume of sales, supported by a well-advertised trade name, is in itself no guarantee of nutritional value. In order to assure that the specification of a food shall be nutritionally adequate access to reliable and unprejudiced medical and scientific advice is imperative. Moreover, when the product has been standardised stringent control must be exercised to ensure that the high quality is constantly maintained. If the food, for example, is fortified with vitamins, the necessary concentrates should not only be included in carefully calibrated amounts, but precaution should be taken against deterioration during processing or storage. In this connection the desirability of packing powdered products, particularly dried milks, in partial vacuum or in an atmosphere of inert gas and with low relative humidity, deserves emphasis. Such treatment preserves the natural vitamin A and carotene, and prevents deterioration in taste through oxidative changes in the fatty constituents.

The various farinaceous agents designed for stiffening cow's milk into gruel or porridge serve a useful purpose in providing a stepping-stone between a completely liquid diet and the solid " table " foods. The manufacturer, however, must avoid the temptation to increase sales by advising an exclusive diet of this character over prolonged periods. To attract the child to more mature dietary habits by easy stages the provision of vegetable purées, such as spinach, tomato and carrot, might well be extended. Meat purées are also to be recommended for this purpose, should food regulations permit, and a case might be urged for the packing of small portions of tender meat and chicken in less finely divided form. In view of its high content in vitamins, and its value as an anti-anæmic agent, special attention should be devoted to liver. Chicken liver, since it is both tasty and tender, should be most valuable if difficulties of supply could be overcome. Sheep liver, which is usually much richer in vitamin A than beef or pig liver, represents another possibility, although its comparative toughness would probably necessitate some process of homogenisation or fine mincing.

New Methods of Welding

C. W. BRETT, M.Inst.W.
Managing Director of Barimar, Ltd.

A SPECIAL significance attaches to maintenance in these days. In normal times replacements are, for the most part, easily procurable. Here and there were firms whose maintenance costs represented so large a proportion of overheads that other means than renewals were sought, with the result that maintenance charges were reduced substantially without a decline in efficiency.

Recent Developments

By far the most important contribution to this highly desirable end is scientific welding; moreover, this dependable remedy for the breakage, wear or corrosion of metal parts of every kind is readily available to-day. Development has been so rapid under the stimulus of wartime requirements that tasks are undertaken now as a matter of routine which a relatively short time ago would have been regarded as impracticable.

The resources outlined are of particular importance in regard to the manufacture of foods. Although rapid and dependable repair in this connection may be regarded as the most important aspect, there are several striking instances of the same methods being applied to the modification of plant to enable it to deal with materials for which it was not originally designed. In some instances special new machinery has been made by fabrication methods which are entirely dependent upon welding and have eliminated the need for castings. In this way the cost of making patterns is avoided, which always implies a substantial saving in cost, for welding is much less expensive when only one or two " off " are called for. The foundry only shows to advantage in the case of repetition work on a moderate or large scale.

Applications of Welding

The main point is the extent to which welding can be applied. Progress has been so rapid of late that even those constantly engaged upon maintenance work may mistakenly ascribe limitations which no longer exist.

Almost any degree of strength is possible. It is for this reason mainly that faulty components reconditioned by welding are usually much superior to a replacement of the original type. If the fault is caused by inherent weakness, then the margin of safety can be advanced to any extent required. On the other hand, if the fault is caused by rapid wear or corrosion the weld metal is selected to give increased resistance to a repetition of this failing. Sometimes specially hard steels or those of the stainless variety are also beneficial. In other instances entirely different materials are used, for it is now possible to weld together totally dissimilar metals; even aluminium can be welded to steel, the resultant union being so strong that tests to destruction invariably cause the weaker of the two parent metals to fail before the weld.

Strength Regained

No class of this work requires more craftsmanship than does that which comes within the category of repairs. At the same time, when the requisite degree of skill and experience are forthcoming there is no

doubt as to the result. In fact, some specialist firms engaged upon this class of welding guarantee every job undertaken on a "money-back" basis. Even engine crankshafts, both small and large, are re-united under this guarantee when breakage has occurred. Proof of strength regained is the fact that of some 750 crankshafts re-united by welding after fracture and the subsequent performance carefully observed, only one failed a second time. Even this was due solely to a flaw in the forging and had nothing to do with the weld, which was some distance away. Although strength is obviously important, accuracy of alignment is no less a vital necessity. Shafts which are distorted when a breakage occurs can be straightened, but the welding operator must mate the broken parts with a maximum of error not exceeding one-thousandth part of an inch as standard practice, and be prepared to work to even finer limits in some cases.

Components which seem to be damaged beyond redemption, at least to a layman, are reconditioned so perfectly that not only is efficiency restored fully but the appearance is often indistinguishable from new. The cost of the work is sometimes less important than the speed with which repairs can be completed. The former is never more than a small fraction of the price of renewal. Even an elaborate repair involving precision machining in the shops of the scientific welding engineer is not likely to take more than twenty-four hours from the time that the damaged item is received.

Sometimes, due to size or bulk, transport is not an economical proposition. This situation may arise when weights exceed 10 to 12 tons, or it may be that a processing container or large boiler has developed a defect. In any event, an apparent obstacle of this kind is soon removed, for skilled operators with portable equipment are always in readiness to go wherever their services may be needed. These facilities have been invaluable on many occasions and some splendid work has been done, particularly when key machines have been damaged and there has been a threat of complete stoppage at some factories.

Reconditioning of Boilers

The way in which boilers are reconditioned is interesting, for the same methods can be applied to metal vats and containers. If the metal has become thin locally in the course of service, the weakened areas are restored to their proper thickness once more by welding new material in position. If the defect is too deep-seated for this, then the faulty portion is quickly cut out and a new section is welded in position with butt joints, leaving a perfectly clean surface both inside and out with no trace of repair. This method is indisputably superior to the old-fashioned patch, which must be riveted and therefore have unsightly lap joints with unwanted ledges to invite scale or other deposits.

A Smashed Machine

Not long ago a cubing machine was being delivered to a factory when it slipped and fell from the waggon on to a concrete floor. If someone had deliberately tried to wreck this new piece of equipment they could hardly have been more successful. Castings were smashed into pieces, while other parts were bent or broken. An inordinate amount of time would have been lost had it been necessary to wait for a replacement unit, while rebuilding with fresh components, several of them not immediately available, would have taken almost as long.

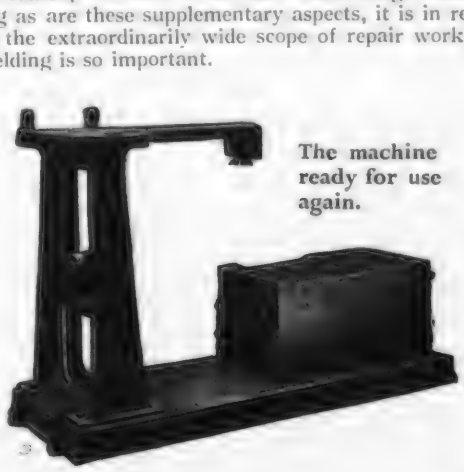
A smashed cubing machine.

Actually the job was considered beyond the skill of welding engineers, but, as this seemed to be the only possible solution, the various parts were collected, put on a motor-truck and sent to a firm of welding specialists. The task was accepted under the usual guarantee, and although some intricate welding, considerable machining and a good deal of fitting was involved, the cubing machine was redelivered within a week, put into almost immediate operation and has continued to perform faultlessly ever since.

Even when gear wheels are smashed and teeth are broken away and lost, the missing sections can be built up afresh and recut, making the wheels or pinions equal to new.

Metal Spraying

An offshoot of welding which is likely to be of some importance in regard to food manufacture is metal spraying. A wire or powder of the metal it is desired to spray is passed through an oxy-acetylene flame, the molten particles being ejected by compressed air. Any matt surface can be given a tenacious coating to any required thickness with the same facility as that afforded by a paint spray; even paper or fabrics can be coated, for there is no risk of scorching. Interesting as are these supplementary aspects, it is in regard to the extraordinarily wide scope of repair work that welding is so important.



The machine ready for use again.

The Problem of Surplus Food Products

F. Le GROS CLARK, B.A.

HOW MAY communities dispose of their surplus food products? With the Hot Springs Conference this problem assumes global significance; and since most of the foodstuffs involved have to be processed, the problem is of no less interest to the manufacturer than it is to the primary producer and to the underfed consumer. In a matter of this kind an ounce of practical experience is worth a ton of theory; and an attempt is here made to examine the machinery already developed in a few countries, particularly in the United States, for the disposal of foodstuffs surplus to the normal market.

It is now generally accepted that the problem of overproduction is only an aspect of the problem of underconsumption. But the immediate interest of governments has usually been that of preventing a serious fall in farm prices; and only by a coincidence has the dietetic insufficiency of low-income families been merged into the total picture. It was soon appreciated that, if a government is to intervene to lift surplus food from the market, in order to stabilise farm prices, it must either destroy the food out of hand or must adopt the principle of the " double market ". In other words, it must devise machinery for disposing of the food through channels that will not disturb the normal market. The extent to which it can do so is a measure of its success.

Machinery for the Disposal of Food

The experiment in the States began in 1933 and has since developed through a series of stages. The earliest method was known as the Direct Purchase and Distribution Programme, under which the agents of Roosevelt's Agricultural Adjustment Administration made direct purchases in areas where it was found that surpluses were beginning to affect prices. Until the year 1937 it was the custom for the A.A.A. itself to purchase the surplus commodities and to hand them over to an agency, known as the Federal Surplus Commodities Corporation, for distribution in the form of relief; but in 1937 both functions were taken over by the Corporation. The first operations of the Corporation were directly related to the disposal of certain surpluses that were giving peculiar trouble to the Government. In 1933 it arranged for the distribution through relief channels of a portion of the pork made available through the emergency slaughter of hogs; and it disposed of a large butter surplus that had been acquired by the Government in an effort to stabilise prices. In 1934 a considerable number of the twelve million cattle, sheep and other stock, purchased by the Government in the period of drought relief, were turned over to the Corporation for disposal.

Once the Corporation had absorbed the double function of purchase and distribution, the machinery assumed a fairly simple form. As soon as the purchase programme had been decided, the procurement section of the Corporation informed the distribution section of the amounts of food of various kinds it might expect and of the area where purchases were to take place. The distribution section on its part had to be informed of the numbers of families in each State who were eligible for the receipt of surplus products, of the storage facilities at the disposal of states and the supplies of undistributed surplus still in store, of the machinery possessed by the State agencies for reaching the families on relief and of the food habits of these same families. The States themselves were required, through their public welfare departments, to provide personnel, warehouses and transport.

The Problem of Undernourishment

It seems that by 1935 Washington was becoming aware that a more ambitious scheme would have to be devised. Attention was inevitably shifting from farming to the social problem of undernourishment. At all events, in that year authority was given to the Department of Agriculture to " encourage the domestic consumption of such agricultural commodities or products by diverting them by the payment of indemnities or benefits or by other means, from the normal channels of trade and commerce or by increasing their utilisation . . . in low income groups ". To finance this project the law provided that 30 per cent. of the customs revenue should be made available to the Department. A further four years of experimentation led to a profound change in the whole character of the scheme. But in the meantime it was possible to survey the extent of this method of relief through direct purchase and distribution. The relief food, it was found, had not been a large proportion of the total supplies marketed; in general, it had represented no more than 1 to 5 per cent. In the four-year period, that closed with 1938, well over 1,000,000 tons of food were diverted into relief channels; and of this total the meat made available through drought relief made up the largest item, a trifle over 400,000 tons. Other items included butter and lard, sugar, grain products (some 200,000 tons), vegetables, mainly potatoes (250,000 tons) and approximately the same quantity of fruit, mainly citrus.

Wallace's administration in the Department of Agriculture felt confident that they could at least stabilise farm prices for certain commodities; the question now was whether the flow of food into the surplus channels could be increased judiciously to the positive advantage of producers. A possible two-price system was for a time considered; and when Milo Perkins became the head of the office known by then as the Surplus Marketing Administration, the stage was prepared for three new experiments. We have now reached the eve of the outbreak of war in 1939. The three schemes referred to were the " blue stamp plan ", the school lunch programme and the low-cost milk programme.

The Stamp Plan

The stamp plan is essentially a device for distributing the surplus foodstuffs through the normal channels of trade. It is not quite a " two-price " scheme, though it has elements of this contrivance in it. Briefly, the eligible families may purchase orange stamps, which will serve them as cash at any grocery store; to those

who purchase the orange stamps, blue stamps are given free; these blue stamps will buy certain categories of surplus foods at any grocery store.

The plan, as it evolved, revealed some undoubted advantages and a few drawbacks. It simplified of course the processes of distribution, since the Administration had no longer to enter into direct purchasing operations for the purpose. Moreover, the plan helps to reflect the preferences of consumers back to producers and thus tends to prevent chronic over-production of the less popular foods. Experience even before the new schemes were introduced showed that the unloading of certain more expensive foods through relief channels could stimulate normal demand. Thus in several areas an increased demand was noted for grapefruit and peanuts, since the surplus marketing machinery had introduced them to the public; and the sales of dried skimmed milk were greatly stimulated, once the commodity had been popularised among families on relief.

On the other hand, it was found necessary to limit the list of foods purchasable with the blue stamps; for otherwise the families might tend to expend the blue stamps in replacing items of the normal diet and there would be little nutritional benefit to the consumer. There is, furthermore, evidence that the stamp plan is a less effective way of removing surpluses than was the old method of direct purchase; and here, it must be noted, the element of public policy intervenes. The Wallace-Perkins administration was intent on persuading the low-income families not merely to consume more food, but to consume more food of nutritious quality. The foods listed have been mainly fruits and vegetables, meat and dairy products. The lists are reasonably flexible; but since the plan combines the element of administrative selection and a certain element of free choice among the consumers, it does not solve the problem of all conceivable surpluses under all conceivable conditions.

Results of Stamp Plan

The stamp plan, however, is believed to be well justified by results; it is said that Gallup polls show that it has overwhelming public support. The scope of eligibility has been gradually widened; and it is apparent that there is no obvious administrative limit to this process. The families certified as eligible in the early days of the plan included those on relief work schemes, mothers receiving pensions, old age pensioners and the unemployed in receipt of public assistance. But fresh classes have from time to time been included, as for example the families of rejected draftees and those of recruits whose income has been seriously curtailed through the loss of wage-earners. The success of our own National Milk Scheme, the benefits of which extend to all pregnant women and young children without regard to income, has suggested to theorists in the States the advisability of expanding their own stamp plan to embrace such physiological categories as these. The only practical limit to expansion is, in fact, the degree to which the community will countenance the use of public funds for this purpose; for plainly the funds must be drawn from some form of enhanced taxation.

By July, 1942, the number of participants in the stamp plan was approximately 2,600,000, while at the same date apparently a similar number of persons was still in receipt of direct food relief. Doubtless the numbers have fluctuated, since the demands of a war economy have shifted the levels of employment and of wages; but the absorption of certain families into war work has been in some measure counterbalanced by the gradual expansion of the plan itself. Estimated in terms of individual consumption, the stamp plan is said to have enabled 7½ cents. to be spent on a meal, where 5 cents. was spent before; and normally the selection of food consumed would be more nutritious.

School Lunch Schemes

In the August of 1939 the Surplus Marketing Administration began to embrace school lunch schemes within its programme. This new principle of surplus disposal by-passed the stamp plan and arranged for direct supplies of food to the school authorities. There were several advantages inherent in the scheme. Not only was the machinery for distribution already partially in existence, but it could be guaranteed that the food would actually reach the consumers most in need of it. The method of distribution is again simple in its conception. Food is purchased either from growers or from wholesalers and processing firms. The costs involved in the local handling and storage of food are borne by State and local agencies; and the cost of labour in the school canteens is mainly met through the supply of workers on relief.

The scheme has shown very considerable powers of expansion. Thus in the March of 1939, before the new scheme was actually in operation, about 890,000 school children were being daily provided with a lunch. By the March of 1940 the numbers had increased to over 2,480,000, and by the March of 1943 the recorded numbers were 6,200,000. The value of the foodstuffs removed from surplus through this channel of distribution had shown an even more remarkable increase. It rose from 408,000 dollars to 4,368,000 dollars of annual expenditure between the March of 1939 and the March of 1941. It should, of course, be added that the supplies of surplus food thus reaching the school authorities were supplemented by their own local purchases. There are, however, patent weaknesses in the scheme. The interest of the school authorities is to supply balanced and nutritious meals; but the S.M.A. could not guarantee precisely what foods would be surplus from period to period. It was evident that here again the consumer was going to have a serious influence on the market; and that he would be permitted, as he would under the stamp plan, to determine in some measure which foods the farmer could permit himself to produce to surplus capacity. The demands of "a good nutrition policy" had to be fused with the interests of the farming and manufacturing community. There is little doubt that this can be achieved; but there is little doubt that the surplus marketing schemes will have to be associated normally with certain production quota regulations, particularly for the foodstuffs in which demand shows a declining trend.

Low-Cost Milk Programme

The low-cost milk programme in the States bears some resemblance to our own milk schemes; but whereas the British school milk scheme was directly prompted by the surplus milk problem, the American scheme was more closely associated with the general propaganda for nutritional improvement, as well as with the broad turn towards the practice of mixed

arable-stock farming in the States. There had, however, been milk surpluses in various regions for some years before the programme was finally initiated in 1940. The report of the Secretary of Agriculture for that year indicates that the distribution of low-price milk to needy families was reaching a daily average of 65,000 quarts in Boston and 100,000 quarts in Chicago. There is further an arrangement whereby welfare agencies may purchase supplies of milk at a favourable price for distribution to necessitous children. Apparently in both instances the milk is lifted from the farmers at an agreed price, as surplus to normal demands, and passes, however momentarily, through the S.M.A. in its transit to purveyors or to welfare agencies. The purveyors' margin, at all events during the early stages of the scheme, was 2 cents. a quart.

Application to International Needs

From the experience in the handling of surplus foodstuffs some useful lessons may be extracted, and the problem of application to international needs may be briefly discussed. A well-designed surplus marketing scheme has the effect of raising and stabilising farm prices; it implies administrative interference to lift the surplus produce precisely at the point where this surplus is in danger of forcing down prices against the farmer. Thus it must be associated normally with some measures for setting a ceiling on prices as well as a floor; and it begins to eliminate the element of competitive prices from the farmer's experience. On the other hand, the consuming public can never, in the nature of things, expect periods of extremely low food prices; and this presents a further and an acute problem to the welfare services. To the extent to which these schemes tend to raise food prices, the burden will fall the more heavily on those families still ineligible for the purchase of food under the stamp plan or the school lunch programme. This means that there will be an inevitable tendency to spread wider and wider the sphere of eligibility, a tendency that, as we have seen, is already at work in the States.

Schemes Must be Flexible

The shift of interest from the producer to the consumer is a normal feature of these schemes. In times of scarcity, a scheme intended originally to benefit the farming communities may turn into its opposite, *i.e.*, into a scheme for ensuring priority distribution of milk and other foods to certain categories of consumers. This is necessarily accompanied—and it may, as we have shown, be accompanied in normal times—by a pressure on the farmer to divert production from one commodity to another. Certainly all such schemes must be sufficiently flexible (*a*) to prevent excessively high food prices, (*b*) to prevent a serious decline in farm and manufacturing prices, (*c*) to effect such changes in production as will meet the changing demands of the public, (*d*) to encourage the gradual lowering of farm costs, (*e*) to encourage the wholesome rationalisation of distribution processes.

A project that will have such consequences as these is probably a well-contrived scheme. But it commits the farmers to a prospect of guaranteed and thus of more or less predictable price levels; and it implies, we must remember, the constant and possibly increasing diversion of purchasing power from the better-off and presumably the better-fed section of the community to the broad low-income classes. Moreover, as the schemes develop, what had been a surplus is converted gradually into a normal level of production, since it will be met by a stable demand. At some stage, therefore, a new ceiling will have to be set, by means of production quotas, on the extent to which any particular foodstuffs shall be produced.

There has been at present little speculation about the use of this instrument in the world market. It is clear that, when we consider the low consumption levels in many countries even in normal times, there is likely to be in the world a demand not merely for surplus meat, dried milk or vegetable oils, but for wheat, maize and sugar. In the international field such distribution plans as we have been analysing would be a form of dumping. So far both we and the United States have been experimenting in small measure in dumping surplus food not on the export market but along the low-income markets of internal trade. There is, however, the possibility that various countries could arrange a system for the exchange of surplus products (not necessarily, of course, food alone), with the agreement that this flow of commodities shall in both cases be kept outside the usual channels of trade and be confined to the purposes of relief, the provision of school lunches and so forth. This proposal has only a limited application; for many of the most necessitous countries have little they can offer in such a reciprocal arrangement. But while poverty is still with us in the world, it is essential that contrivances of this nature shall be thoroughly explored.

The Institute of Physics

THE Report of the Institute of Physics for 1942, which has just been issued, shows that special attention has been given by its Board to urgent questions concerning the training and supply of physicists needed for war purposes. The Board is able to record with gratification that its views not only coincided in almost every respect with those of the Government's Technical Personnel Committee, but were being embodied in measures that were being taken. A good deal of attention has also been given to considerations concerning the best way of ensuring to intending physicists after the war an education that will enable them to make their fullest contribution to the service of the community. A report on this matter was prepared by a sub-committee under the chairmanship of Sir Lawrence Bragg, and this has been approved and adopted by the Board of the Institute and has recently been published. It represents the considered views of teachers in the universities and technical colleges and of the heads of Government and industrial research establishments.

A record increase in membership of the Institute is revealed. The normal activities of the Institute and its branches have continued with but little modification on account of war circumstances. Among the new activities recorded are the establishment of an Electronics Group of the Institute, and of the Joint Council of Professional Scientists, of which the Institute is one of the principal constituents. Exchange of information concerning physicists and their relation to the war effort has continued between the Institute and the American Institute of Physics.

Rennet

Every year thousands of gallons of liquid rennet are used in the manufacture of cheese which is universally recognised as an important and valuable item of our diet. Last year, for example, over 6,000 gallons of rennet were used for this purpose. Similar, if not larger quantities are consumed in the domestic preparation of junket. These uses of rennet make the detailed knowledge concerning it of considerable importance.

N. J. BERRIDGE, Ph.D., A.R.I.C.

(*National Institute for Research in Dairying*)

NUMEROUS interesting observations on rennet were made by the early investigators, as may be seen in Effront's book.[1] It was readily discovered, for example, that rennet added to cold milk was unable to make it coagulate, but at blood heat coagulation was rapid. If the temperature were too high there was again no coagulation. An optimum near 40° C. was found.

Again, although this was before the days of clear understanding of the importance of hydrogen ion concentration (as distinct from titratable acidity), it was soon found that alkalis inhibited the clotting of milk by rennet, while acids, such as, for example, lactic acid, formed by bacteria during souring accelerated it. It was also found that certain ions such as calcium and magnesium aided the clotting, and that others, like sodium, had the opposite effect. Further, boiling the milk was shown to retard its coagulation by rennet subsequently added, owing to the removal, as an insoluble salt, of the calcium ions.

Attempts to obtain the enzyme in a chemically pure state, to determine its chemical nature, and to find out how it works, have been made rather more recently. The work on these topics forms an interesting, if somewhat contradictory, series of investigations, which will be examined briefly after considering the more immediately practical aspects of manufacture and use.

Sources of Rennet

True rennet is extracted from the fourth stomach or abomasum (commercially termed the "vell") of the young calf. It exists in the mucous membrane lining the abomasum largely as pro-rennin, an inactive precursor which becomes active under acid conditions. Proteolytic enzymes from other sources, even from plants, are also able to clot milk, but they all behave differently from rennet, both in the laboratory and in the dairy, so that probably true rennin occurs only in the abomasum of the calf. This enzyme has never been obtained in a demonstrably pure state. Commercial preparations contain much organic matter, of which probably about one-tenth is pure rennin. (The word "rennin" may be used to denote the pure substance so far recognisable only by its action and its source, "rennet" being used for the various impure preparations.) The usual impurities in commercial rennet are not necessarily deleterious.

Manufacturers of rennet, whether for cheese or junket-making, do not aim at obtaining a pure preparation, but merely one which will have and keep a high activity, and which will be of suitable hygienic quality. The activity of liquid cheese-making rennets is such that about 4,500 parts of milk may be coagulated by 1 part of rennet. Rennet for making junket in the home is, of course, more dilute, for convenience in measuring. The preparations maintain their activity quite well, diminishing only at the rate of 5 to 10 per cent. in a year, but this rate differs with different preparations, even with different samples of the same brand, so that it is difficult to give a particular figure. One source[2] mentions up to 1 per cent. per month as the rate of loss.

Hygienic Quality

Unfortunately, the hygienic quality of rennet is not always high, and there is a danger that as long as rennet is active and not actually putrid some cheese-makers will be willing to use it; even putrid rennet has, on occasion, been used. The bacteria within and on the vells multiply during the collection of the latter, and during the extraction of the rennet, and only a proportion of these are killed when preservatives such as boric acid are added during the manufacturing process. Others continue to live and after a time may even resume growth. When it is considered that not only do the vells contain remnants of the calves' food of a diverse character, but also that there is, in some cases, a considerable delay in collecting and drying them, and that during this delay many types of bacteria multiply freely, it can be seen that the flora of the extracting tank must be both numerous and varied. Even if bacteriostatic substances are added at the commencement of the extraction, the number of micro-organisms from the vells will still be considerable unless the latter have been preserved in the dry state for a long time. There is thus a definite chance of harmful bacteria being present in the rennet.

Nature of Bacterial Contamination

Anaerobic putrefactive bacteria are particularly dangerous, since those which are not completely inhibited by the acidity of the curd will be able to grow inside the cheese in the absence of air. Once they begin to grow they are able, by producing ammonia, to neutralise the acidity of the medium, whereby it is made more suitable for the further multiplication of this type of organism. Various amines, some of which are highly poisonous, are then produced, so that the cheese becomes quite unfit for consumption. Some years ago this happened on a large scale. Thousands of stinking cheeses had to be buried.

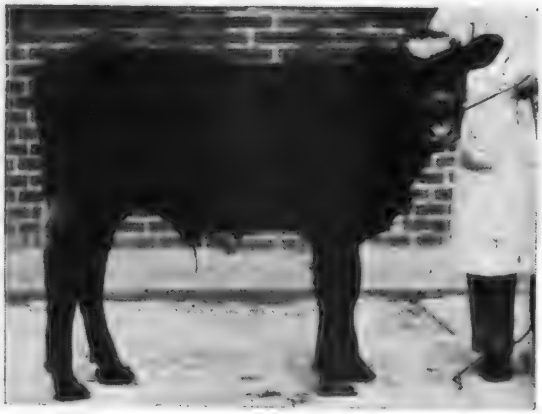


Fig 1.—Rennet-producing calf. The tip of the cannula can just be seen.

During the ripening of the milk intended for cheese, and before the addition of rennet, the lactic acid bacteria become very numerous, and to these is added only a small proportion of rennet, so that it seldom happens that commercial rennet is infected sufficiently to cause serious trouble, but it can be seen that, unless the rennet is sterilised, there is a certain though small degree of risk of contamination. How often the production of second- or third-grade cheese instead of first is due to the presence of undesirable bacteria in the rennet is, of course, not known, but it may be due to this in a fair proportion of the cases. Such considerations should be borne in mind when considering the use of " doubtful " rennet.

The danger from undesirable organisms increases with the age of the rennet. The longer it is kept, the greater is the chance of their multiplying, and the larger is the quantity of liquid required owing to its diminishing strength. The use of dry rennet, which has recently become available as powder or tablets, overcomes both these difficulties, since the activity is not lost, and bacteria cannot multiply in the dry solid. Dry rennet is easily dissolved when required for use. It is being used by an increasing number of cheese-makers.[3]

Methods of Manufacture

It is not easy to find out what methods are actually in use in the manufacture of rennet, although a number of processes have been patented. Probably the usual procedure is to take vells which have been dried by inflating and hanging in a warm, well-ventilated room, and to extract these with dilute brine. When extraction is complete the liquid is drained off the vells, its salt concentration raised to about 18 per cent. and preservatives added. It is allowed to stand in this state for some time, probably several weeks, until all the pro-rennin is activated (see below), most of the mucin and insoluble proteins precipitated, and a proportion of the bacteria killed. The resulting dark brown, fairly clear liquid is then decanted from the precipitate into bottles or casks and sold.

The above general method of preparation occurs with many modifications, such as, for example, that in which the extraction is carried out with N/10 HCl at 42° C. for 45 minutes.[4] A method recently patented[5] uses precipitation under very acid conditions as a means of concentrating and at the same time sterilising the rennet. The bacterial count is reduced by this process from about 8,000 to less than 40 per ml. With rennet made by this process there is therefore comparatively little danger of bacterial contamination.

Substitutes for Rennet

As already pointed out, true rennet is prepared only from vells of young calves. When vells are in short supply the question of using stomachs from other animals or older calves arises. If this is done, however, the rennet will probably contain pepsin, which is said to produce bitter flavours when used for cheese-making, although the evidence for this is not conclusive.[6]

Since there is liable to be a shortage of vells during wartime, the possibility of finding suitable substitutes has to be considered. Enzymes which can be used for cheese-making can be obtained from several plant sources—*e.g.*, *Withania coagulans*—but they are probably not suitable for use in this country in wartime. Certain bacteria also secrete enzymes capable of clotting sweet milk. An interesting investigation recently carried out here[7] along these lines aimed at producing rennet from living calves. A Russian scientist[8] had already claimed that this could be done, and his work was confirmed. It was found that, by a fairly simple operation, a fistula could be made into a calf's abomasum and could be fitted with an ebonite cannula, allowing the convenient withdrawal of gastric juice from the calf at any time. The cannula did not interfere with the health and general well-being of the animal in any way. In fact, the care bestowed on the experimental animals led them, in spite of the strain of producing extra gastric juice, to grow rapidly and to maintain an excellent condition. A photograph of one of them is shown in Fig. 1. The rennet obtained was used to make cheese, and was indistinguishable in use from ordinary rennet. It was concluded that, should vells become unobtainable, this method provides a virtually unlimited source of rennet, but that under present conditions the expense involved would be too great to justify its use.

Clotting Time

Among facts which users of rennet have to bear in mind is the so-called Law of Segelke and Storch, which states that the clotting-time of a milk-rennet mixture is inversely proportional to the concentration of rennet in the milk. This law holds, however, only over a small range of rennet concentration. Very little rennet clots quicker than one would expect, and large quantities of rennet take longer to clot than the law requires. Other practical points are that pasteurised milk takes slightly longer to clot than fresh; that the clotting-time of milk increases on standing unless acid-forming bacteria grow, when it decreases; that milk from cows suffering from mastitis clots slowly or not at all, on account of its higher *p*H and lower ratio of casein + calcium to globulin + sodium.

Rennet plays an important part in the ripening of cheese. As the acidity increases owing to the activities of the lactic acid bacteria, the proteolytic power of the rennet increases, so that it produces, by a gradual breakdown of the proteins of the curd, some of the

changes which transform the rubbery mass into cheese of characteristic texture.[9, 10, 11] Davis[12] has found that commercial rennet shows a number of different enzymic activities, all of which are probably important in the process of ripening.

It has already been pointed out that enzymes other than rennin are able to clot milk. Pepsin is among these, and since this, too, is prepared from gastric mucosæ, there was for some years considerable controversy over the question of whether pepsin and rennin were identical. The evidence accumulated by a number of workers has now shown that pepsin is different from rennin. The ratio of proteolytic power to milk-clotting power is greater for pepsin than for rennin, and the clotting power of pepsin is more affected by the acidity of the milk than is that of rennin.[13] The enzymes differ in their resistance to extremes of *p*H. Urease, acetone, and blood serum all inhibit the clotting power of pepsin more than that of rennin.[14] It is therefore concluded that rennin is distinct from pepsin.

Chemical Nature of Rennin

There is not yet general agreement concerning the chemical nature of rennin. Some workers claim to have obtained the enzyme practically free from nitrogen, while others report preparations apparently no less active, but which have quite a high nitrogen content. Fenger,[13] for example, found 14 per cent. N in his preparation, while Lüers and Bader[15] obtained 75 mg. of a highly active substance with only 0·68 per cent. of N. They extracted calf stomachs with sodium acetate solution, precipitated the proteins of this extract with lead acetate, eluted the rennin by the immediate addition of phosphate buffer, and purified the resulting preparation by repeated adsorptions on to alumina or kaolin and elutions with phosphate buffer at *p*H 7·0. This preparation coagulated 16×10^6 times its weight of milk in 40 minutes. Similar results have been obtained more recently by Rao *et al.*,[16] who found that rennin could be eluted with dilute acid from the precipitate which formed when an acid extract of calf stomach was dialysed. On adjusting the eluate to *p*H 5·4 a precipitate was again formed, and from this purer rennin could be eluted with acid. This procedure could be repeated several times to give a highly purified product. This purer rennin was adsorbed on to successive portions of partly dried Ca phosphate, the third of which, on dissolving in acid, gave a final product free from nitrogen, and very active. These workers make the interesting suggestion that ascorbic acid is part of the rennin molecule, since they state that even their purest preparation contained this vitamin.

Protein Nature of Rennin?

In marked contrast to this work is that of Tauber and Kleiner.[17] When they dialysed their extract of gastric mucosa they obtained rennin in solution. This they adjusted to *p*H 5·4 and precipitated by adding alcohol to 50 per cent. By dissolving this precipitate in water and again precipitating they obtained a preparation which could clot 9×10^6 times its weight of reconstituted milk containing $CaCl_2$, and which contained 14·4 per cent. N and 1·19 per cent. S.

Hankinson and Palmer[18] also bring forward evidence of the protein nature of rennin. From commercial rennet by repeated precipitation at *p*H 4·5 and solution at *p*H 6 in diminishing volumes of 16·7 per cent. NaCl they obtained a globulin which would coagulate 72×10^6 parts of fresh raw skim milk (containing sufficient $CaCl_2$ to depress the *p*H to 5·75-5·80) in 10 minutes at 40° C.

Hankinson[19] has recently claimed to have obtained crystalline rennin by the slow addition of acid to a dialysed solution of purified commercial rennet. The preliminary purification consisted of precipitation by saturating with NaCl at *p*H 5 to 6. The crystals were in the form of white needles, but they were difficult to photograph on account of brownian motion and of their gradual disappearance when placed under the microscope, and, indeed, the published photograph does not demonstrate the crystalline form of Hankinson's preparation. However, the substance was clearly of very high activity and probably also of a comparatively high degree of purity, so that it provides further evidence for the protein nature of rennin.

Crystalline Rennin

The preliminary note[20] lately published by the author describes how crystalline rennin was obtained by a prolonged fractional crystallisation procedure from material previously purified by adsorption and elution and by many precipitations by saturation with sodium chloride or half saturation with ammonium or magnesium sulphate. Crystallisation could be induced by the slow addition of saturated magnesium sulphate solution to a stirred solution of the rennin. Owing to the large effect on crystallisation of small quantities of such substances as mucin (Northrop[21]), there are many imperfections in these crystals, but many of them take the form of plates of uniform thickness, sometimes of irregular outline, but with a marked tendency to the rectangular or triangular shape. They are highly active and quite stable, and will remain for weeks on a slide under a sealed cover slip. A photomicrograph of a few crystals is shown in Fig. 2.

Purity of Rennin

None of the workers on rennin has yet produced any convincing evidence of the purity of their preparations. Perhaps in the case of the earlier work that was because the enzymes obtained were known to be impure.

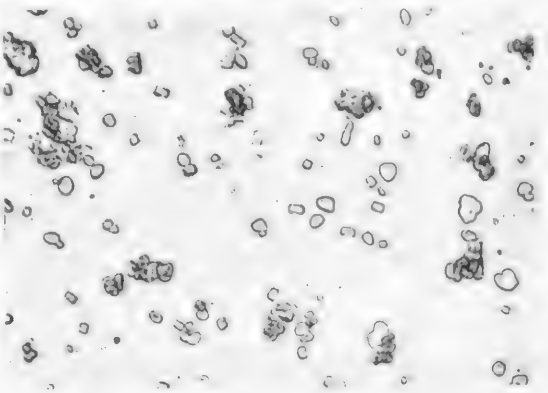


Fig. 2.—Rennin crystals.

Now, however, with the improved technique of protein chemistry it is possible to obtain reasonably pure enzyme preparations as demonstrated, for example, by Northrop in the case of pepsin.[21] The same author has also shown how solubility curves may be used as a test of purity. A pure substance should have a constant solubility independent of the amount of solid added to the solvent. That this is often not the case with proteins is due to their consisting of a mixture of several components. Thus it should be possible to obtain pure rennin and to demonstrate its purity by solubility experiments. This would pave the way for valuable work on the properties of the enzyme. Preliminary work on the crystals obtained by the author indicated that they are probably pure rennin.

The lack of purity of the products obtained by different workers may account to some extent for the discrepancies between the various results recorded above, but it seems doubtful whether it can do so completely, for most of the preparations, nitrogen-free or not, seem to be capable of clotting several million times their weight of milk. Although milk is very variable and although some workers use as a substrate milk containing added calcium chloride, which is more sensitive to rennet than ordinary milk, so that accurate comparison of the results of one worker with those of another is impossible, it is unlikely that the variations are sufficient to allow of the activity of the nitrogen-free preparations being due to the presence of an undetectable trace of rennin protein. It is therefore not impossible that those who have obtained rennin of very low nitrogen content have succeeded in separating an active non-protein prosthetic group from the protein moiety of the native rennin molecule. The very small quantities and the very unstable nature of the nitrogen-free preparations contrasted with the very much larger quantities of comparatively very stable rennin protein which may be obtained, support this view. If the nitrogen-free enzyme could be obtained from the pure crystalline protein, the question would be definitely settled. There are, of course, also other possibilities, such as the existence of several rennins, one of which does not contain nitrogen.

Mechanism of Milk Clotting

The mechanism of the clotting of milk has been a subject of speculation ever since rennin has been known. Theories of various complexity have been brought forward from time to time. It has long been known that clotting takes place in two stages and that the enzyme plays a part only in the first stage. Linderstrøm Lang,[22] basing his argument on careful fractionation of casein and on the fact that any proteolytic enzyme can cause clotting, stated that casein in milk is an unstable system consisting of substances forming insoluble salts with the calcium of the milk held in solution by the agency of a protective colloid. The hydrolysis of this colloid by any enzyme led to the second phase of the process, the precipitation of the insoluble calcium salts. The author[23] has been able to show that the second phase is not merely the precipitation of insoluble salts, but is a heat denaturation of the casein, for the change has the high-temperature coefficient of 1·3 to 1·6 per degree centigrade which is exhibited only by such reactions as the heat denaturation of proteins. It is therefore suggested that rennin acts by hydrolysing certain bonds in the casein molecule which help to keep the polypeptide chain of the native protein in the folded condition. When these bonds have been broken the molecule, which would in its native state have withstood temperatures of over 100° C., becomes so unstable that at temperatures of less than 30° C. it unfolds to give extended chains typical of denatured proteins. These, by linking up with one another, give rise to a molecular network which forms the gel.

The manufacture of rennet is but a small cog in the vast machinery of our food production. It is nevertheless a necessary one. Increased efficiency in its functioning is being sought by the application of scientific control and by research on the numerous problems connected with its preparation and behaviour.

REFERENCES

1. Effront, J., *Biochemical Catalysts in Life and Industry*, Chapman and Hall, Ltd., London, 1917.
2. Hansen's *Dairy Bulletin*, xvi, p. 3.
3. Bennion, N., Davis, J. G. and Thornley, B. D., *Agric. Progr.*, **17**, 48-50 (1940).
4. Keil, H. L., and Stout, B. K., B.P. 503,730, Aug. 31, 1938.
5. Benger's Food, Ltd., Thornley, B. D. and Hilton, S., B.P. 532,458, July 22, 1939.
6. Davis, W. L., Davis, J. G., Dearden, D. V. and Mattick, A. T. R., *J. Dairy Res.*, **5**, 144 (1934).
7. Berridge, N. J., Davis, J. G., Kon, P. M., Kon, S. K., and Spratling, F. R., *J. Dairy Res.*, **14**, 145 (1943).
8. Fomin, D., *Molochno Maslodel 'naya Prom.*, **9**, 16 (1939).
9. Sherwood, J. R., and Whitehead, H. R., *J. Dairy Res.*, **5**, 208.
10. Sherwood, J. R., *J. Dairy Res.*, **6**, 204.
11. Sherwood, J. R., *J. Dairy Res.*, **6**, 407.
12. Davis, J. G., and Davies, W. L., *J. Soc. Chem. Ind.*, **53**, 1083.
13. Fenger, F., *J. Am. Chem. Soc.*, **45**, 249.
14. Tauber, H., *J. Biol. Chem.*, 107, 161 (1934).
15. Lüers, H., and Bader, J., *Biochem. Zeits.*, **190**, 122.
16. Rao, C. N. B., Rao, M. V. L., Ramaswamy, U. S., and Subrahmanyan, V., *Current Sci.*, **4**, 215 (1941).
17. Tauber, H., and Kleiner, J. S., *J. Biol. Chem.*, **96**, 745 (1932).
18. Hankinson, C. L., and Palmer, L. S., *J. Dairy Sci.*, **25**, 277 (1942).
19. Hankinson, C. L., *J. Dairy Sci.*, **26**, 53.
20. Berridge, N. J., *Nature*, **151**, 473 (1943).
21. Northrop, J. H., *Crystalline Enzymes*, Columbia University Press.
22. Linderstrøm Lang, *Z. Physiol. Chem.*, **176**, 76 (1928).
23. Berridge, N. J., *Nature*, **149**, 194 (1942).

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Canadian Fish for the United Kingdom

THE MINISTRY of Food has asked Canada and Newfoundland for increased supplies of fish to meet not only the demands of the armed forces, but of civilians. Arrangements are therefore being made for shipment to the United Kingdom of frozen fish in bulk as well as practically the whole of the 1943 salmon pack; also a major percentage of the pack of tinned herrings. These will run, all told, to figures not previously reached so far as Canadian exports to this country are concerned, notwithstanding the heavy supplies forwarded in 1942.

Tinned and frozen fresh fish are referred to in the latest requests from Great Britain for Canadian supplies. If quantities such as Lord Woolton would like to have could be exported Canada would be glad of the opportunity. It is, however, as well to point out that among problems which affect other industries, in the present stage of the war, is the production of supplies beyond normal, since man-power in the fisheries, no less than in lumbering, mining, agriculture and manufacturing, is a difficulty not easily overcome. The fishing industry also needs boats, while at the same time the Dominion is having about all it can do to supply the Navy and the Mercantile Marine, so enormously expanded the past three years. Equipment is also needed, and fishery supplies, particularly rope, are hard to get just now.

Except for these and a few other problems, not forgetting the hazards of fishing on the Atlantic Coast with U-boats prowling about, the enquiry from London would be a welcome chance to expand Canada's fishing industry. At the moment the quantity requested appears to be almost outside the capacity of Canada and Newfoundland to supply, although an attempt will be made to meet the situation as fully as possible.

One of To-day's Problems

Canada has rationed meats to her own people in order to furnish the United Kingdom with greater quantities while the war lasts. It has therefore been urged that Canadians should supplement their meat diet with fish in order to overcome the difficulty of getting all the meat for the United Kingdom which the armed forces and munition workers require. But it is not an easy matter to keep the home market supplied with fresh fish and at the same time maintain a large export trade, which is of course important for the industry generally and for the securing of foreign exchange. Canada normally consumes about 60,000,000 pounds of fresh and frozen fish yearly, which are largely fillets. About two-thirds of the annual output have been exported in times past, mostly to the United States.

How to increase the output of fillets and other fresh fish products is in fact one of today's somewhat difficult problems. Perhaps study of all the conditions and circumstances may reveal ways and means of solving it, although to an observer it seems almost insoluble if increased supplies to the United Kingdom are not to be met out of the quantity of fish at present consumed by Canadians.

There is no complaint that nearly all of Canada's output of canned salmon and canned herring last year was sent to the Old Country. Shipments of fillets and fresh fish were relatively small, amounting to 738,000 cwt., valued at about £300,000. If the minimum fish needs of Canadians can be determined, the necessary additions to the export supply will no doubt be arranged. Possibly a close investigation of the industry and the application of regulations to get fishermen back to the shore will result in finding further exportable supplies. It would be an important addition to Canada's war effort as well as a means of strengthening the fishing industry in all its departments.

A Notable Expansion

Apparently production should be possible where 60 varieties of food dishes are taken, some of them in very large quantities. The Fishery Department at Ottawa also claims that the Dominion has the largest fishing grounds in the world, the figures being 8,000 square miles in the Bay of Fundy, nearly 80,000 square miles in the Gulf of St. Lawrence, 34,000 square miles as Canada's share of the Great Lakes, 200,000 square miles in the North Atlantic, and inland lakes, all told, which contain about half the fresh water on the planet, while the Pacific Coast is 7,180 miles long and famous for certain varieties of fish.

The total quantity taken from all these sources in 1942 is not yet published, but in 1941 the figures were 12,000,000 cwt., valued at some £8,000,000. Appreciation of Canadian tinned salmon has been expressed by the armed forces of the Allies on this side of the Atlantic, and especially since the 1942 pack of 1,800,000 cases (48 lbs. each) came across.

One notable thing in this regard has been done by the war—a great increase in the herring-packing industry. Before the war there had been some small shipments to Great Britain. But in 1941 nearly a million cases were sent over, and last year the total was even greater. Shipments from Canada's 1943 pack may break even that record.

Cleansing of Churns

As there appears to be some uncertainty as to the legal position in regard to the cleansing of churns, the following statement has been issued for the information of the trade press and all persons concerned:

> The statutory requirements in regard to the cleansing of churns are set out in the Milk and Dairies Order, 1926. The onus is placed upon buyers to return churns in a clean condition, and upon producers of milk to ensure that milk is only put into clean containers. Failure to comply with the requirements of the Order is an offence for which fines may be imposed.
>
> In the case of milk sold by wholesale, two people are thus responsible for ensuring that the churns used are clean—*i.e.*, the producer and the buyer. It should, however, be pointed out that Section 21 of Part 5 of the Order was primarily introduced to ensure that *all vessels* used for containing, measuring or stirring milk are kept in a state of thorough

cleanliness. It covers churns or other receptacles owned and used by a producer-retailer and the containers used by a purchasing retailer, quite apart from churns used for the transportation of milk from the farm to the purchaser's dairy.

The statutory position is in no way altered—and indeed cannot be altered—by the form of contract G.C.42 prescribed by the Milk Marketing Board or the Schedule to the Milk (Sales to Distributors) Order, 1942, which sets out the terms upon which the Ministry of Food resell milk to distributors.

The Board's contract states: "Churns shall, if necessary, be washed by the producer with boiling water and soda or other approved detergent before use". This merely underlines the responsibility already imposed upon the producer by the Milk and Dairies Order.

The primary purpose of the paragraph quoted in the Milk (Sales to Distributors) Order is to make it clear that, unless otherwise agreed, the buyer must supply churns, and in doing so it adds the qualifying remark that they must be thoroughly cleansed, but this does not mean either—

(*a*) That the purchaser can agree with the producer to send back churns in a dirty condition, or

(*b*) That in the event of the producer finding the churns the purchaser has no responsibility for cleansing them after receipt of the milk.

So far as the cleansing of churns is concerned, the Schedule to the 1942 Order does not, of course, fully state the requirementsof the Milk and Dairies Order, but this is unnecessary, since the Milk and Dairies Order is still in force.

It must be understood that there is a distinction to be drawn between the statutory requirements of the Milk and Dairies Order and the terms of sale which are set out as a Schedule to the 1942 Order.

New Process for Bread

SINCE many small bakers can only maintain their production satisfactorily by the use of overnight methods of fermentation, the following process has been worked out by the Cereals Research Laboratory of the Ministry of Food. It has been extensively used and most satisfactory bread can be produced.

The method is a sponge and dough method. For a one-sack mixing the following is the recipe for the overnight sponge:

Water	4 gallons.
Flour	70 lbs.
Yeast	3 ozs.
Yeast food	2 ozs.
Salt	12 ozs.

Stand 16 hours. Temperature 70° F.

In the morning this sponge is doughed up with:

Water	11 gallons.
Flour	210 lbs.
Yeast	1½-2 lbs.
Salt	4¼ lbs.

Stand 30-50 minutes. Temperature 80° F.

1. The time the dough stands before scaling will depend on the quantity of yeast used. Give a full fermentation, since good bread depends on correct fermentation.

2. When the dough is being made, 3 lbs. of salt should be dissolved in the liquor and the remainer sprinkled in the dough when partly made.

3. When making the dough, break down the yeast in the water and add a scoopful of flour, since this starts the yeast working vigorously.

4. Do not abuse the dough at scaling. After scaling give time for recovery before final moulding.

The above method incorporates the old-time overnight sponge method with the modern short dough time procedure. The bread possesses, as a result, a flavour suggestive of an amalgamation of both methods.

Numerous complaints have been received of dampness and streakiness in National bread; underbaking is the cause of both of these troubles.

Underfermentation and underbaking are partly responsible for variations in the colour of National bread.

Dehydration Factory No. 1

(*Continued from page 290*)

The connection to the vacuum pump is closed and nitrogen allowed to enter the chamber until the pressure has amounted to 2 lb. above atmospheric. The tins are then removed and the two holes closed by soldering.

The tins are then tested for leaks. A special device is clamped on to the tin whereby it is perforated without allowing air and water to enter the perforation. This consists of a metal point which is contained in the centre of a rubber cap, which fits firmly on the side of the can. The cap is fitted with a tube connected with a cylinder of nitrogen. Fitted thus, the tin is plunged into a tank of water and a pressure of gas built up. Should there be any leaks in the seams, bubbles will appear and the tin is duly resoldered at the point of the leak. If none appear, the tin is duly passed as perfect and proceeds to the painting table, where the seams are painted by hand with the aforementioned bituminous lacquer. Finally, the tins are packed into fibre-board cases, each containing two. Four-gallon cans contain 10 lb. of dried potato, which is equivalent to approximately 1 cwt. of the raw tuber.

Cabbages and Carrots

The method for the preparation of cabbages is similar to that used for potatoes. The cabbages are trimmed by hand, and from the trimming belts go to the stripping machine.

Cabbages receive some special treatment during the blanching operation. In order to maintain the *p*H of the material within the limits of 7 to 7·5, a sufficient quantity of sodium carbonate is added to the scalding water. The plant is fitted with the necessary equipment to deliver measured quantities of both sodium carbonate and sulphite.

Dried cabbage is considerably more bulky than potato, and the standard 4-gallon tin will only hold 4 lb. of the finished product.

The procedure for dried carrots is broadly on the same lines as that for potatoes and cabbages.

News from the Industry

Chocolate and Sweets Ration

The Ministry of Food has decided to adjust the sugar allocation to chocolate and sugar confectionery manufacturers. The change will not affect the combined ration of chocolate and sweets, but eventually there will be a somewhat greater proportion of sweets available with a correspondingly small proportion of block chocolate.

* * *

Mr. John MacLean

The Ministry of Food has appointed Mr. John MacLean as Chief Scottish Adviser on Home-Grown Cereals and Cereal Products, other than flour. The appointment took effect from July 19.

In consequence of this appointment, Mr. MacLean, with the consent of the Ministry, has relinquished his other appointments in the Ministry of Food, but as Chief Adviser will retain the chairmanship of the Oatmeal and Pearl Barley Advisory Committees, and will be ex-officio a member of the Home-Grown Cereals Advisory Committee.

* * *

Amendment to the Eggs Control and Prices Order

The Minister of Food has amended the Eggs (Control and Prices) (Great Britain) Order, 1942, with effect from July 25, 1943.

Provision has been made to deal with the ration documents valid for use during the new rationing year beginning July 25, 1943.

The Order also provides that producers, having under their care, control, or management over twenty-five head of poultry, who are not otherwise registered for the purposes of the Order with a licensed buyer or licensed packer, shall be deemed to be registered with the nearest licensed packer. Such producers must not, of course, sell, dispose of or part with the possession of eggs produced by them except to the licensed buyer or licensed packer with whom they are registered under the terms of the Order.

Prices of Oils and Fats

The Ministry of Food announces that there will be no change in the existing prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period July 25 to September 18, 1943.

* * *

Prohibition of Manufacture and Sale of Ice Cream

The Ministry of Food desires to draw attention to the Ice Cream (Prohibition of Manufacture and Sales) Order, 1942, which prohibits the manufacture and sale of ice cream or water ices.

It has come to the attention of the Ministry that products of a character somewhat akin to ice cream are being manufactured for sale. The Ministry is advised that these products are food within the meaning of the Manufactured and Pre-packed Foods (Control) Order, and it is an offence to manufacture them unless a return has been rendered in accordance with Article 2 of that Order or unless they are manufactured solely for sale as part of a meal. Any such offences will be made the subject of prosecution.

* * *

Conditions of Food Sales

The Ministry of Food is receiving a number of complaints that some traders make a practice of offering for sale in one lot two or more varieties of foodstuffs, and refuse to allow a purchaser to buy only one of the varieties offered unless he buys the whole lot.

It cannot be too widely known that this practice is a contravention of the Food (Conditions of Sale) Order, and that under that Order any trader (manufacturer, wholesaler or retailer) who refuses to sell any article of food to a purchaser except on the condition whether express or implied that the latter will buy another article is guilty of an offence against the Defence (General) Regulations, 1939. The Ministry will not hesitate to institute a prosecution in any case of this character which is brought to its notice.

Supplies of Custard and Blancmange Powders

The Ministry of Food wishes to make it clear that the increased allocations of basic materials to manufacturers of custard and blancmange powder will permit an increase in the volume of production of those foods from 70 per cent. of pre-war (as it is now) to 80 per cent. of pre-war—not an increase of 80 per cent. as has been stated in some quarters.

* * *

Toluene and Toluol

Under a new Order issued by the Minister of Supply, increases are made in the maximum prices of various grades of toluene and toluol. In addition, alterations are made in descriptions and classifications of the materials. A test for the determination of toluene contained in toluol is given in an appendix to the Order.

The new order, the Control of Toluene (No. 3) Order, 1943, supersedes the (No. 2) Order, 1940, and came into force on July 20.

Copies can be obtained from H.M. Stationery Office, York House, Kingsway, W.C.2, or through any bookseller, price 1d.

* * *

Control of Animal Glues

A new Order issued by the Minister of Supply prohibits, except under licence, the acquisition, disposal, and consumption of animal glues and gelatines and fish glue in excess of the following quantities a quarter: glues and gelatines other than edible gelatine and fish glue, 6 tons; edible gelatine, 5 cwt.; fish glue, 3 cwt. The Order does not apply to gelatine or stock arising in the course of the manufacture of meat products and used in these meat products, nor does it apply to gelatine pre-packed under licence granted by the Minister of Food. Applications for licences should be sent to the Ministry of Supply, R.M.2C, Carlton House Terrace, S.W.1, from which address application forms may be obtained.

Milk Powder for Biscuits, Cake and Flour Confectionery

The Ministry of Food announces that after the completion of the current (August/September) allocation of milk powder for use in the manufacture of biscuits, cake and flour confectionery, allocations for this purpose will be discontinued until further notice.

* * *

Control of Essential Oils

The importation and distribution of essential oils came under regulation as from the beginning of July. There are about 70 of these oils, used mainly in the production of soap, perfume, cosmetics, etc., and prior to the war purchases from abroad involved about £1,000,000. The Ministry of Food will determine the proportions in which each variety of oil is to be divided among various approved trades using essential oils; and in order to ensure that the equitable distribution of oils is not disturbed by war circumstances a buffer stock is to be maintained. This will be held by a number of approved firms. One result of the scheme will be to bring down prices very considerably. For instance, the price of lemon oil, which has been selling to manufacturers at 60s. per lb., will on the inception of the scheme come down to less than 20s. Similarly peppermint oil, recently selling at 120s., will be reduced in price to under 40s.

* * *

CHANGES OF ADDRESS

J. J. Gerry (Plymouth) Limited

J. J. Gerry (Plymouth), Limited, advise that the address of their head office is: Norley Place, Plymouth. Telephone: Plymouth 4194. Telegraphic address: "Oakdale, Plymouth". The office at 61, Mutley Plain, Plymouth, has been closed.

* * *

Honeywill and Stein, Limited

Messrs. Honeywill and Stein, Limited, have returned to London, their address being 21, St. James's Square, London, S.W.1. Telephone: Whitehall 8021/7. Telegrams: Brostein, Piccy, London, and Tyche, Piccy, London.

Cheese Averages

The following average loss allowances operated in respect of all cheese covered by delivery orders issued by B.A.C.A.L. on behalf of the Ministry dated on and after July 17, 1943: Australia, 4½ per cent.; Canada, 3 per cent.; New Zealand, 4½ per cent.; U.S.A., 2 per cent.

* * *

Bacon for Britain

A new Meat Board order has been issued in Canada calling for the reduction of pig slaughters for the domestic market, in order to maintain regular shipments of bacon to Britain during the summer.

The Dominion has undertaken to supply 85 per cent. of Britain's bacon requirements this year.—*Reuter.*

* * *

Labour Position in the Bread Trade

The Ministry of Food finds it necessary to obtain detailed particulars of the labour position in the bread trade, in order to determine what steps may be taken to ensure that labour is still available and at the same time that the requirements of the Services are met. A fairly detailed form of questionnaire is being distributed by Divisional Food Offices of the Ministry to about 10 per cent. of the bakers in each division, and it is hoped that this will furnish a representative cross section of the industry.

Also, a smaller and simpler form of questionnaire is being addressed to every baker in the country who is claiming bread subsidy. It follows, therefore, that at least 10 per cent. of the trade will be required to complete two questionnaires, and the particulars furnished in both cases will relate to the week ended July 10, 1943.

The difficulties which are being experienced are understood, but an equitable allocation of labour can be made only if all of the material facts are available.

The Ministry asks therefore for the co-operation of the trade in providing the necessary information.

Yawa Fibre for Paper-Making

Paper mills in this country are to test the possibilities of Yawa fibre from Nigeria, from which it is thought a specially fine paper tissue can be manufactured. If experiments on the first shipment are successful, Nigerian farmers will be encouraged to grow more Yawa plants.

* * *

Canned Fish Brokers

Canned Fish Brokers' Clearance Agency, formed July 27 as a company limited by guarantee, is to act as agent for the Ministry of Food in the distribution of canned fish. The management committee consists of Messrs. A. A. Bouteiller, agent, R. Caldwell, A. C. Coltman, R. B. Goepel, merchant, B. E. Haygarth, canned goods broker, J. D. Hibberd, A. E. Norris and W. J. Shapton, broker. The registered office is at 101, Cannon Street, E.C.4.

* * *

United Nations Food Commission

Mr. L. B. Pearson, Minister Counsellor of the Canadian Legation in Washington, was chosen permanent chairman of the United Nations Interim Commission on Food and Agriculture.

The Commission, representing forty-four countries, was formally organised to draft food plans for a post-war world.

It was recommended by the recent United Nations Food Conference. Pavel I. Techegula of the Soviet Union and Tsou Ting-Wen of China were named vice-chairmen.

* * *

British are now Better Nourished

The British people as a whole, and the poorer classes in particular, are now better nourished than in peacetime, said Dr. J. A. Scott Watson, British Agricultural Attaché in Washington, to a conference in Chicago of Middle West farming federations, reports Reuter.

"Although the British diet is uninteresting and unappetising to many people, Britain's nutrition experts have done a good job," he declared.

Food Manufacture

Use of Sugar Factory Lime

There is much activity now in the region of most beet sugar factories, where local farmers are taking the opportunity of liming their grass fields direct with factory carbonate of lime—a valuable by-product of the beet sugar industry containing some phosphate as well as lime. The interval between hay and corn harvest affords an excellent opportunity of securing a supply of this kind of lime, and so great is the demand in some areas that reports have been received of over 500 tons having been delivered in a day from one factory.

* * *

Blackcurrant Bushes

Commercial fruit-growers and others will be interested in the Register of certified stocks of blackcurrant bushes which is now available, free and post-free from the Secretary, Ministry of Agriculture and Fisheries, Lindum Hotel, St. Annes, Lytham St. Annes, Lancs. This register gives particulars of the stocks which have been certified this season by the Ministry in respect of health and purity.

Growers are reminded that under the Horticultural (Cropping) Amendment and Consolidation Order, 1942, the consent of their War Agricultural Executive Committee will be required for all plantings of blackcurrants on holdings exceeding ¼ acre. Such consent will be restricted to certified stocks.

* * *

Training for Canteen Management

A two-year, full-time course in canteen management, open to secondary-school girls after 16 to 17, is being started by the London County Council in co-operation with the National Society of Caterers to Industry and the trade unions associated in the National Joint Industrial Council for the Industrial Catering Trade. It is to be given at the L.C.C. South-East London Technical Institute.

Information about the scheme, which may be extended to other parts of the country, can be obtained from the Principal, L.C.C. South-East London Technical Institute, Lewisham, S.E. 4.

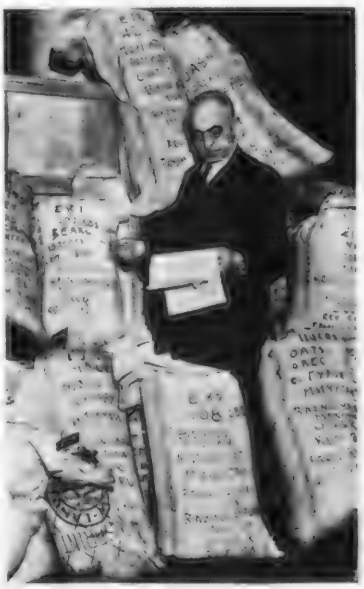
Royal Warrant for Norfolk Firm

Wm. Gaymer and Son, Ltd., Attleborough, have been honoured with a Royal Warrant of Appointment to her Majesty Queen Mary. The firm already hold the appointment to his Majesty King George VI. in addition to those granted for King George V. and King Edward VIII. (now the Duke of Windsor). This is believed to constitute a record for a Norfolk business, at least during recent time.

* * *

American Seeds for Russia

An official of Russian War Relief is shown in the illustration at the agency's New York warehouse checking some of the sacks of seed just arrived from all over the United States for shipment to the U.S.S.R. More than 3,500,000 lbs. of field and vegetable seeds, contributed by thousands of American farmers, seedsmen and other individuals, are being sent to Russia to replant 350,000 acres of Russian earth laid waste to prevent the harvest from falling into German hands. Among the field seeds contributed were Tenmark and Kymka, two species originally brought to the U.S. sixty years ago by Ukrainian immigrants and used by American farmers to transform the "dust bowl" in the U.S. Middle West into fertile grain fields.



Mr. Frank George

By his recent election as Vice-President-Elect of the National Association of British and Irish Millers, Mr. Frank George of Wellingborough earns the warm congratulations of millers in the Midlands and all millers in Northamptonshire in particular.

Mr. George is managing director of Whitworth Bros., Ltd., chairman and managing director of "Weetabix", and of Messrs. Cadge and Colman, flour millers, Peterborough, Amos Pitcher, Ltd., bakers, Leicester, and many other food concerns.

* * *

Canadian Dehydrated Potatoes for Britain

Britain has asked Canada to supply 5,000 tons of dehydrated vegetables from this year's crop—equivalent to 35,000 tons of fresh vegetables. Greatest demand is for dehydrated potatoes; other requirements are chiefly carrots, cabbages and turnips.—*Reuter.*

* * *

Argentine Oils for Home Consumption

Exports of all important edible vegetable oils normally produced in Argentina have now been prohibited to assure sufficient supplies for domestic consumption, according to the Department of Agriculture's Office of Foreign Agricultural Relations.

Sunflower seed and oil exports were prohibited on May 6; exports of peanuts, cottonseed, rapeseed and their corresponding oils were prohibited on June 1. Those four crops supply the raw materials for virtually all of the edible vegetable oil produced in Argentina.

Present estimates indicate that the 1943 production of edible vegetable oils will amount to only about 112,000 metric tons compared with 200,000 tons in 1942, the first time since 1930 that the production of such oils has shown a reduction from the preceding year's output. The reduction is attributed in part to the severe drought which prevailed during the late months of 1942 and the early months of 1943, and partly to a reduction of about 10 per cent. in the total area sown to edible oil-seed crops in 1942-43.

Imports of Port Wine and Sherry

The Ministry of Food has approved the import of a further 500 tons of port wine from Portugal and 500 tons of sherry from Spain where shipping space not required for priority cargo becomes available.

Allocations will be made in Oporto and Jerez by the United Kingdom Commercial Corporation as on the previous occasion, and the wine will be distributed in this country as nearly as possible in accordance with pre-war trade. The maximum retail price of the wine will be 14s. 6d. a bottle for port and 15s. a bottle for sherry.

Ten per cent. of the wine will be allocated for British officers' messes.

These quantities are extremely small in relation to the total demand and the public must not expect as a result of these imports any noticeable change in the supply position.

* * *

Twenty-seven "Protections" of Milk

A foreign dairy has found a new and ingenious form of advertising its milk. In introducing it to the public the dairy includes a "certificate of purity" with every bottle: this is a guarantee of the protections—27 in number—that surround the milk. On this certificate the 27 protections are enumerated with the following statement:

"We hereby certify that our milk, protected in 27 ways, is pure, rich milk, produced in strict accordance with the 27 rigid safeguards listed herewith:

1. Selected farms and herds.
2. Herds fed balanced rations.
3. Cattle tested regularly.
4. Medical examination of employees.
5. Rigid tests of each cow's milk.
6. Cows washed before milking.
7. Utensils sterilised before milking.
8. Clean, sunlit milking barns.
9. Milk immediately cooled on farm.
10. Rapid transport to plant.
11. Milk tested in laboratory as received.
12. Prompt scientific plant handling.
13. Plant equipment sterilised daily.
14. Plant supervision by dairy specialists.
15. Accurate pasteurisation.
16. Scientific pasteurisation control.
17. Immediate cooling after pasteurisation.
18. Bottles automatically sterilised.
19. Bottles inspected before filling.
20. Automatic filling and capping.
21. New sanitary outer cap.
22. Milk kept at 40° F. awaiting delivery.
23. Fresh laundered uniforms for workers.
24. Courteous, skilled drivers.
25. Refrigerator delivery lorries.
26. Prompt delivery from 'Farm to You'.
27. A reliable company behind its product."

(*Milk Messenger.*)

* * *

Pectin—Substitute for Gums

As a substitute for water-soluble gums which are imported, pectin has shown promise in certain cases as an emulsifying and thickening agent in foods and pharmaceuticals. Dextrin from grain starches can fill in for some of the natural gums, especially acacia.

* * *

Food Subsidies

During the financial year ended March 31 food subsidies cost £145,000,000. They represented, in the case of the principal commodities concerned, reductions in retail price amounts: Bread, 2d. per 4 lbs.; flour, 3½d. per 7 lbs.; meat, 1½d. per 1 lb.; milk, ½d. per quart; potatoes, 3½d. per 7 lbs.; Eggs, 1s. 9d. per dozen; sugar for home use, 2½d. per lb. In addition, under the National Milk Scheme, milk is sold at 2d. per pint or free, as compared with the current retail price of 4d. and 4½d. People with small fixed incomes will appreciate how food subsidies help them.

In Germany, no fresh milk at all is supplied to normal consumers, such small supplies as are available being diverted to the making of butter so as to help maintain the meagre fat rations of that unhappy country. Here, on the other hand, milk production is still increasing, in spite of the ploughing-up policy and severe restrictions upon imported feeding stuffs for cows.

Powdered Eggs from London, Ontario

The O-Pee-Chee Company, London, Ontario, will soon begin packaging powdered eggs for export. This commodity will move in barrels to the London Cold Storage Warehouse from which point it will be removed as required to the O-Pee-Chee plant at Adelaide Street, Toronto, where it will be packed in 5-oz. containers and reshipped to England.

* * *

Packing Materials

In common with other commodities, packing materials are scarce, but Abbott's Wood Wool, Ltd., advise that limited supplies are still available. Among these are wrapping paper, cartons of different sizes, string, gummed tape, cellulose wadding for special trades, packing cases, straw and wood wool for packing.

* * *

Industrial Clogs

With the introduction of clothes rationing, it became apparent that some type of protective footwear would become necessary for the great number of women who were being drafted into industry, particularly in those factories with concrete floors and constantly wet with water, oil, etc., soon making useless street shoes with leather soles. Messrs. Eatoughs, Ltd., conceived the idea of manufacturing a wooden-soled clog which, in addition to being practical, had the advantage of a certain style appeal, which was lacking in the old-type clog.

The Director of Civilian Footwear (Board of Trade) approved the new clog and its style has been standardised by the Board of Trade as the official munition workers or light industrial clog. It is now being made for men as well as women.

This clog is sold direct to factories and, providing a factory inspector will grant a certificate of essentiality, the clog is coupon free, otherwise two coupons per pair are needed. Eatoughs have already produced and distributed over 350,000 pairs to all types of factories throughout the country, many of them engaged in some branch of food production.

British Standards Institution

The annual general meeting of the British Standards Institution was held on July 20, following a luncheon at which the Rt. Hon. Mr. Hugh Dalton, M.P., President of the Board of Trade, was the principal guest.

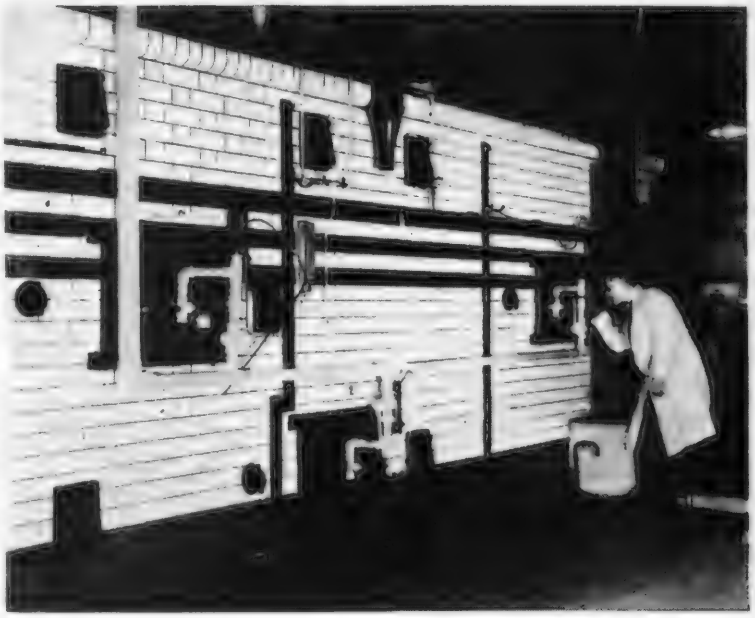
Sir Percy Ashley, K.B.E., C.B., the chairman, reviewing the present position of the Institution, said that 230 new and revised British Standards had been issued during the past year and the total number of British Standards now in use numbered 1,500, all of which could be consulted at the library of the Institution, where copies of Overseas Standards were also available. Complete sets of British Standards were available for inspection at British diplomatic and Trade Commissioner Offices in 16 centres in the British Commonwealth, 2 in the U.S.A., 6 in South America, 6 in Europe, 1 in Egypt and 1 in Persia.

* * *

The Mono Pump

A single rotor, rolling in a fixed stator, constitutes the mechanism of the Mono Pump. The stator, which is normally of rubber, has the form of a double internal helix, and the rotor is also of helical form, but with a single scroll and with half the pitch of the stator. The rotor maintains a constant seal across the stator, and the two elements engage with one another in such a way that this seal travels continuously along the stator, producing a uniform and positive displacement.

On this original and simple principle has been created a pump, made by Mono Pumps, Limited, which has a unique combination of practical advantages. The pump is specially applicable for general use in the meat and bacon curing industry, not only for brine injection for curing, but for handling by-products such as lard, fat and blood, for which it is particularly suitable because of its ability to deal with semi-solids and viscous fluids. It is also extensively used for handling soup liquors, meat extract and gelatinous extract. For hydraulic rams for ham presses the Mono Pump also plays an important part.



Temperature Control in Biscuit Ovens

For the control of the operation of biscuit ovens and similar continuously operating gas-fired baking ovens in the food industries an example of a continuous gas flow recorder which shows, by means of a curve drawn by a pen mechanism, the consumption of gas is the "Arkon" gas flow recorder, a production of Walker, Crosweller and Co., Ltd.

For baking oven installations the standard low-pressure type of instrument is used, with a chart recording up to 20 ins. W.G. The principle of the instrument is the operation of a float of special paraboloid form, suspended in water within the casing, the volume being measured on the differential pressure principle. In most cases an orifice plate is inserted in the gas-pipe and the slight differential pressure created by the flow of gas through the orifice measured by the recorder and shown on the chart in terms of flow (cubic ft.).

Illustrated here is a typical gas flow installation of this type, operating with success on a biscuit oven of the treble conveyor type at a well-known works in London, where the temperature control is given by manual adjustment of the flow of town gas. The oven is 16 ft. long by 12 ft. wide, while there are 76 gas burners of the high-pressure type, operating at 6 ins. W.G. For this purpose the town gas, supplied by a 3-in. main, is boosted with an electrically driven compressor, and the recording instrument is coupled to an orifice place inserted in the 3-in. gas main to the inlet side of the compressor, that is representing the low-pressure conditions in the gas as supplied to the factory. It is well known, of course, that different temperatures are required for different types of biscuit, and that a water biscuit, a "Marie" biscuit, or a cream cracker, for example, requires a much hotter oven than a digestive biscuit or a shortbread biscuit.

* * *

Vitamin Summary

A "Vitamin Summary" based on present knowledge of vitamins, which shows clearly, in tabulated form, daily requirements, toxicity, tests for deficiency, etc., has recently been published. The information is contained on a card which folds to convenient size and is issued by the Charterhouse Rheumatism Clinic. It is available to the public at sixpence, post free. No charge is made to the medical profession.

Institute of Physics

At the annual general meeting of the Institute of Physics held on Thursday, July 22 last, the following were elected to take office on October 1, 1943: President, Sir Frank Smith; vice-presidents, Mr. E. R. Davies, Dr. W. Makower and Mr. T. Smith; hon. treasurer, Major C. E. S. Phillips; hon. secretary, Professor J. A. Crowther; ordinary members of the board, Professor J. D. Cockroft, Mr. D. C. Gall, Dr. H. Lowery, Mr. D. A. Oliver, Mr. A. J. Philpot, and Mr R. S. Whipple.

* * *

Review of Cocoa Industry

The Government is at present reviewing the future of the cocoa industry, not only in British West Africa, but with reference to the Colonies as a whole.

This statement was made in the House of Commons recently by Mr. Oliver Stanley, Secretary for the Colonies, in reply to a question.

Current production of cocoa in West Africa was at approximately the pre-war level. Of the current production for last season, just over one-third had been exported up to the end of June, and substantial shipments were expected to continue.

* * *

Health of the Worker

The Central Council for Health Education have announced that the specimens of leaflets and poster reproductions produced with the view to the reduction of absenteeism through sickness have proved very popular with factory managements throughout the country and resulted in requests for supplies totalling over a quarter of a million copies within the first three weeks. The leaflets cover a number of subjects, and are classified under different headings such as health hints, special wartime booklets, factory leaflets, etc. Such subjects as the care of the feet, rest and relaxation, advice to dyspeptics, influenza, war against lice, etc., are dealt with, and posters are available on many of the subjects. Further details may be obtained from Mr. John Lee, General Secretary, at Tavistock House, Tavistock Square, London, W.C.1.

Edible Pulses for Fish Friers

After consultation with representatives of the trade, the Ministry of Food announce that owing to the recent reductions in the points values of edible pulses the number of points issued to fish friers and other miscellaneous users who are not licensed as catering establishments was reduced by 50 per cent. from July 25.

It has been agreed, however, that no trader subjected to the reduction shall receive less than 500 points each eight weeks on the new basis, and that the reduction shall not be applied to any trader to whom in the past less than 500 points were issued each eight weeks.

* * *

U.S.S.R. Food News

Daghestan canneries in the first half of this year turned out over 4,000,000 cans of tinned foods in excess of the plan. The leading canneries of Daghestan produced more than their whole year's plan in less than six months.

* * *

More than 200,000 school-children are working on the collective farm and State farm fields of Kazakhstan helping to bring in the harvest.

Over 27,000 children from town and village schools of one region alone in the Transcaucasian Republic of Georgia are working in the fields of State and Collective farms. The results of their work are excellent. One young communist, for instance, fulfils 150 per cent. of her quota each day. The school-children have already to their credit a total of about 500,000 labour days. Similar reports come from many parts of the Soviet Union.

* * *

A considerable expansion of the meat and milk products industry is reported. A large number of new plants and installations have been set up, making it possible to avoid transport of these foodstuffs over the long distances previously necessary for the supply of certain towns. Meat packing and dairy enterprises have been re-established in the Stalingrad and North Caucasian areas, including the towns of Stalingrad, Rostov, Krasnodar, Nalchik and Armavir.—*Soviet Monitor.*

*p*H Value of Cured Meat

The *p*H value of cured pork has a direct influence on the colour development in the meat. With a *p*H below 5 it is impossible to obtain proper colour fixation. Moreover, the meat becomes less tender with decreasing *p*H; moisture loss or shrink increases and the flavour is sour. A *p*H range of 5·2 to 6 seems best for the meat.—*National Can.*

* * *

Buckwheat

Buckwheat as human food is nutritious and very good. In my country, Russia, it is a staple food and takes the place of rice. My family and friends all like it. It is easy to grow and does not require much space.

First tossed in hot fat for a few minutes, then covered with boiling water with a good pinch of salt, and either simmered in a saucepan or cooked in a casserole in the open for one hour, it makes a delicious accompaniment to meat, or can be eaten with milk or butter. Several firms sell buckwheat seeds in this country. —Letter to *The Times.*

* * *

Thirst at Sea

In an article in the May number of the *Reader's Digest*, entitled "Survive at Sea by Eating and Drinking Fish", the writer (American) states that the raw flesh of a freshly caught fish contains a large quantity of a watery fluid which can be squeezed out of it by pressure or by wrapping it in a clean napkin and twisting the ends. It is a pink liquid, and tastes sweet, with only the slightest suggestion of fish about it. Two seamen volunteered to drink no water for ten days and live for that time on ordinary "abandon ship" rations and fish juices. They came through the test in perfect health. Alternatively the raw flesh can be chewed, and the solid matter rejected, which is the method the natives of Tahiti adopt. Apparently the United States Navy is taking up the idea, and is ordering life-boats and rafts to be fitted up with fishing tackle, nets, etc., so that no one in future need die of thirst so long as they have the means to catch fish.

More Honey from West Indies

More honey from the West Indies may be arriving in this country soon. The honey will be shipped on deck space that would otherwise be unused.

* * *

Stimulating Growth of Fruit Trees

Butylene has been shown by Russian investigations to have a stimulating effect on the speed of growth of fruit trees, bringing them to fruition far faster than when it is not employed. Application of butylene was recommended especially for those areas where the growth season is too short to permit the full maturing of trees due to inclement weather.

* * *

Mission to Argentina

A joint Anglo-American mission of technical experts under the auspices of the Combined Food Board has arrived in Argentina to survey the facilities for the production of dairy and poultry products, with special reference to processing and dehydrating.

The Board announced, in general line with the Food Board's customary function, that the mission is interested in the quantities of dried skim milk, butter and dried eggs that might be available to the United Kingdom under proper conditions of price and quality.

The American members of the party, which left Washington on July 1, are Mr. Gordon W. Sprague of the Office of Foreign Agricultural Relations, Mr. Jay G. Odell of the Food Distribution Administration, and Mr. Frank Stone, Consultant, War Food Administration. They were joined in Argentina by a fourth member, Mr. Paul A. Nyhus, Agricultural Attaché at Buenos Aires. The British members are Mr. James Clement and Mr. James H. Carmichael of the Ministry of Food, and Dr. W. H. Cook of the Canadian National Research Council, whose services have been lent by the Canadian Government. The members of the mission are not purchasers or negotiators; but are technical dairy and poultry experts who are interested in the quality of current and potentially available supplies.

OBITER DICTA

● Onions are giving the Food Ministry a severe headache.—*"Aberdeen Press and Journal."*

● The people who get scurvy nowadays are usually old men who do their own cooking or women who live on freak diet.—*Dr. Graham George.*

● What makes it so difficult to get Scotch oats in England?—*Mr. Thorne, House of Commons.*

● The Scots eat them.—*Sir Herbert Williams, in reply to the above.*

● I will only serve chips with fish.—*Owner of fish and chip shop.*

● Fishing industry organisation is one of Scotland's post-war problems.—*"Daily Record and Mail."*

● Arrangements are being made to can food in smaller tins, so that people with small incomes can distribute their points more economically.—*Mr. Mabane.*

● Do we know definitely that when milk contains dead microbes it is perfectly safe to drink?—*Lord Teviot in the House of Lords.*

● That all people of the world can have enough to eat is not a dreamer's vision—not a chart to be drawn up and put away in a file. We know how to produce the foods we need.—*Mr. Paul H. Appleby, U.S. Under Secretary of Agriculture.*

● I am one of those pernicious persons, referred to by the noble Lord (Lord Strabolgi), who wish to abolish the food rations when the war is over, to abolish them as swiftly as may be.—*Lord Beaverbrook in the House of Lords.*

● I have heard the suggestion that some business men having railed at red tape all their lives have now become bureaucratic-minded themselves; and conversely some of the permanent civil servants, who have hitherto been tucked away in remote official departments, have seized with both hands the big chance for initiative and enterprise which the Ministry of Food has encouraged them to show.—*Sir John Bodinnar, J.P., Commercial Secretary at the Minister of Food's Press Conference, July 20, 1943.*

Holidays-at-Home

The Holidays-at-Home Committee (chairman, Alan P. Good, Esq.) of the Brush Electrical Engineering Co., Ltd., Loughborough, and its subsidiaries, provided the company's employees with a notable programme for their holiday week in July, in which figured well-known bands and artistes.

The open-air activities were in the form of sports. Golf was represented by Henry Cotton, and Squadron-Leader Dan Maskell arranged a tennis exhibition. These, with circus, cricket, bowls, whist, dances and games for the children, made an enjoyable holiday for the Brush employees.

* * *

Lovell and Christmas

The past year's small decline in profits of Lovell and Christmas, provision merchants and importers, was attributed by Mr. William G. Lovell at the forty-eighth meeting of the company to the gradual restriction in the supply of foodstuffs and the consequent lower earnings of some of the more important subsidiary companies. Nevertheless, the subsidiaries on the whole have continued to give satisfactory results. In prevailing circumstances Government control is an important factor in the affairs of the company. Some of the businesses have been closed down and others have been transferred to war-time associations. In such matters the chairman looks for a continuance of fair treatment by the Ministry.

When control is ended there will doubtless be many problems of trading to solve, but one thing the chairman feels can be relied on is the goodwill which exists between the company as importers and the shippers in overseas countries on the one hand, and buyers in this country on the other. The company is associated with Newforge (of Northern Ireland), which is manufacturing a variety of foods. So far as Lovell and Christmas is concerned, national policy at present restricts the sale of Newforge products to soup, but when full liberty of manufacture and distribution is restored it will be possible to handle many other products.—*Financial Times.*

COMPANIES

SCRIBBANS & CO., LTD.

The sixteenth annual general meeting of Scribbans and Co., Limited, was held recently at the May Fair Hotel, Berkeley Street, London, S.W.

Mr. Philip E. Hill, the chairman of the company, presided.

The Secretary (Mr. John Oram, M.A., C.A.) having read the notice convening the meeting and the report of the auditors,

The Chairman said: Gentlemen, the profits of the year, after making provision for taxation, amount to £118,958, as against £118,570 for the previous year. The necessary provision has been made in these accounts for the depreciation of buildings, plant, and machinery. We have shown separately on the balance-sheet, in accordance with the practice prevailing, our reserve for future taxation. It has been our custom to make a reserve for taxation on the profits as they are earned, and we are now showing separately that part of the reserve which is applicable to the future, instead of, as in previous years, including this under the heading of Sundry Trade and Other Creditors and Provision for Taxation.

There is a decrease in our stock-in-trade of approximately £50,000 from last year, but last year's figure was an exceptional one, due to the necessity at that period of holding very large stocks, and the present figure of £170,348 may be considered normal.

Turning to our investments in subsidiary companies, there is an increase of some £40,000, which is explained by a further purchase of share capital in our main subsidiary, George Kemp, Limited, and also by the fact that the shares in our Northern Irish business are now held directly by this company instead of by a subsidiary. Subject to your approval, the directors propose to place to the general reserve a sum of £25,000 and to carry forward a sum of £59,578. If you take into account the £25,000 which it is proposed to place to the reserve, plus the £59,578 which it is proposed to carry forward, your total reserves now stand at £409,578.

Unfortunately, the difficulties of working which I mentioned last year have in no way decreased. During the year further numbers of our employees have been called upon either for military service or for munitions, and it has been necessary to simplify production to the greatest possible extent in order to make it possible to release these people; it is for that reason the public are no longer able to obtain the large variety of our products which it was our custom to offer in pre-war days. In addition, during the year the materials made available for biscuits and cakes have been further reduced, and it is not possible to offer the same tonnage as in normal days.

In order to save transport and man-power further very heavy restrictions have been placed on the distribution of our goods, and in common with other manufacturers of similar products our goods are now available only in specified areas. Added to this the attentions of the enemy made working conditions very difficult for a period.

Your company continues to undertake work for the Government and the Forces and to be of assistance in every way possible, and I should like to pay a tribute to all ranks of the personnel for their hard work and loyalty during the year and, with my knowledge of the relationships, I am certain we can look forward to a continuance of their efforts. Since the close of the financial year the profits of the company and its subsidiary companies have been well maintained.

The report and accounts were unanimously adopted.

* * *

McDougalls Trust, Limited

The tenth ordinary general meeting of McDougalls Trust, Ltd., was held on August 6 in London. Mr. Kenneth A. E. Moore, the chairman, presided.

The following is an extract from the chairman's statement:

The accounts of the operating company, McDougalls, Limited, for the year ended March 31, 1943, show hardly a ripple on the surface—the profit of £256,382, which corresponds approximately with the pre-war standard for Excess Profits Tax purposes, being a thousand or two higher than in recent years.

The business has, in fact, earned profits substantially in excess of £250,000 in each year since the imposition of Excess Profits Tax and since the inception of Government control of flour milling operations, but such excess is for Government account either in terms of Excess Profits Tax or by adjustment of remuneration under the Government agreements with the milling industry. Throughout this period the dividends paid by McDougalls Trust, Limited, have been stabilised at £202,000, enabling the latter company to maintain the customary dividend of 10 per cent. on its ordinary shares.

The rationing of all the principal articles of food, other than flour, has not unnaturally led to an increase in the consumption of flour, not only in the form of bread but also in the form for which McDougalls Self-Raising Flour has always been pre-eminent—namely, home-cooked puddings, pastries, cakes, etc. In this and other ways (for example, the increased consumption of potatoes) no one in this country has yet gone short of what is required for the maintenance of health and energy—in fact, statistics point to a definite improvement in public health, showing that the combination of rationed and unrationed foods available to the public is adequate.

The one thing we have never been short of is wheat (except for the first few months of the war for which we ourselves had provided), and for that we have to thank the Government, the Royal Navy, Merchant Navy, and farmers. It is rather in the unspectacular but essential details such as paper, cardboard, string, and even gum that our material difficulties have at times seemed formidable. In the end none has proved insuperable.

* * *

Midland Bank, Limited

The directors of the Midland Bank, Limited, announce an interim dividend for the half-year ended June 30 last at the rate of 8 per cent. actual less income-tax, payable on July 15 next. The same rate of dividend was declared a year ago.

Information and Advice

Fish Cakes

8,837. *Required, recipe for fish cakes. Also names of any firm which specialises in machinery which can be adapted to mass production of this line.* (Scotland.)

(*a*) A recipe is purely a matter of experiments to meet local tastes and, more important, the materials should be at present available. The following may serve as a basis for experiment :

3 lbs. boned cooked fish.
3½ lbs. mashed potatoes.
½ lb. rusk.
½ pt. milk.
3 eggs.

Chop fish coarsely, add rusk, and season to taste with pepper, salt and chopped parsley. Add milk, stir over fire until thoroughly minced, allow to cook, shape into small round cakes, coat with egg and rusk.

Fry in hot fat until lightly browned, drain off all fat.

Obviously this formula must be modified and some ingenuity exercised in finding substitutes for materials not at present obtainable.

(*b*) Names of firms specialising in the various equipment required were given, but it was pointed out that they are not necessarily in a position to supply at the moment.

Pickling Cucumbers

8,818. *Required, recipe for pickling cucumbers or gherkins.* (Cumb.)

The following may be helpful as a basis for experiment :

Small cucumbers, usually known as gherkins, are cured in brine by the normal process and are used in mixed pickles and sweet pickles and sometimes sold packed in vinegar as pickled gherkins.

Cucumbers larger in size than gherkins are known as bastards. They are seldom pickled whole, but sliced or chopped are used extensively in mixed pickles, piccalilli, etc.

For brining the cucumbers are put into wooden tanks and brine showing 40° salinometer is used. This can be made up by adding about 1 lb. of salt to 1 gallon of water. The preparation of cucumber pickles is not an easy one, and research and actual practice are needed, as the process involves fermentation and ageing.

Brined cucumbers should be examined for crispness. The cucumbers are taken from the brine and allowed to drain in wicker baskets for an hour or so. They are then put into a second tub with an equal weight of a solution of 80 per cent. acetic acid in water and stood for 24 hours with occasional stirring. The liquor is drained off and replaced with a fresh lot of acetic acid solution and stood for a further 24 hours. They are allowed to drain again for an hour or so, filled into jars and filled up with vinegar of 6 per cent. acetic acid.

The making of pickles is definitely an art, and it would be advisable, at any rate in the first place, to enlist the services of an experienced pickle-maker to set the job going.

Cold Storage of Meat Products

8,813. *Is it possible to store with safety the following items : pork galantine, liver sausage, breakfast sausage, cow heel and pork rinds, at a temperature between 15° and 18° F. for a period of, say, 6-12 months? Would the quality of these goods deteriorate?* (Sussex.)

According to the literature, cured bacon will keep for 3-4 months at 10°-12° F. ; sausages will keep 1½ months at 28°-30° F., the relative humidity being 74-75 per cent. ; frozen pork will keep 7 months at 5°-10° F., relative humidity being 56 per cent.

The length of storage life of foodstuffs is determined by the process and treatment prior to storage and the degree of humidity is very important. It is not usual to wish to keep sausages and galantine from 6-12 months in store, and it is possible that these made-up articles would deteriorate in quality.

An article on the storage of food is published in the June, 1937, issue of FOOD MANUFACTURE entitled " The Storage of Food for the Emergency of War ", by John J. Piqué.

Information Supplied

8,782. *Information concerning licences for doing wholesale business in spices.* (Herts.)

8,786. *Manufacturers of can openers.* (London.)

8,788. *Manufacturers of pressure cookers for meat.* (Notts.)

8,789. *Information on supplies of " Extrin ".* (Som.)

8,791. *Manufacturers of machinery for making synthetic cream.* (Suffolk.)

8,794. *Manufacturers of pans with which to fry potato crisps.* (Yorks.)

8,795. *Suppliers of fruit concentrates.* (Leics.)

8,798. *Information on potato pulp treatment.* (Lancs.)

8,799. *Suppliers of a thickening agent.* (Yorks.)

8,804. *Manufacturers of compound animal feeding-stuff.* (London.)

Information Required

8,838. *Wanted, a simple method of treating rose and other natural leaves to enable them to retain the natural characteristics and appearance over a period of weeks or perhaps months, and which would enable them to be used as non-edible decoration for cakes and such like.* (London.)

8,849. *Wanted, name of a firm or firms who could supply a cereal base for a baby's food. We are interested in a base consisting of a farinaceous product in which the starch has been rendered more digestible by the process of baking. We ourselves would dextrinise or/and malt the product, but we do not wish to burden ourselves with steam-heated boiling pans and roller dryers.*

This project cannot be entered upon until after the war, but we would like to complete all preliminary investigations as soon as possible. (Cumb.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

550,109. EASYCANTOP, LTD., and WALENSKY, B.: Cans or like containers.
550,115. KENNEDY, D. S.: Apparatus for drying grain.
550,161. FIDDES, J.: Boxes, crates, and like containers.
550,192. COLLINS, H. E. C., HODGES, J. M., and MANLOVE ALLIOTT AND CO., LTD.: Means for an improved method of sterilisation in what are known as high-pressure sterilisers.
550,256. BARTLETT AND SON (METAL WORKERS), LTD., G. F. E., and WALLIS, B. H.: Apparatus for dispensing beverages.
550,275. FOSTER, F. H., and BUTTERLEY CO., LTD.: Refrigerating machinery.
550,412. KUSTNER FRERES AND CIE SOC. ANON.: Machines for moulding butter and other substances.
550,421. LYONS AND CO., LTD., J., and BUSHILL, J. H.: Process for treating edible animal flesh for the production of food products.
550,472. DRAYTON REGULATOR AND INSTRUMENT CO., LTD,, and GROVER, R. V.: Automatic control apparatus for temperature, fluid pressure, or humidity.
550,474. AKTIEBOLAGET ELEKTROLUX: Absorption refrigerating apparatus.
550,487. FROSTED FOODS, LTD. (GENERAL FOODS CORPORATION): Refrigerating apparatus.
550,512. FOSTER, F. H., and BUTTERLEY CO., LTD.: Refrigerating systems.
550,514. BARRINGTON, R. R.: Closure devices for jars, containers, pipes, and the like.
550,520. FARNELL, E. A.: Lids for use with bottles, jars, containers, and the like.
550,539. DU PONT DE NEMOURS AND CO., E. I., and WOODHOUSE, J. C.: Baking-powders and like raising compositions.
550,604. SCHAFER, J. B., and HOLMES, H. W.: Closure for cans or tins and like containers.
550,665. SCHOLEY, H.: Process for the manufacture of boxes and other hollow articles.
550,674. NEWELL AND CO., LTD., E., and HOWDEN, P.: Rotary driers and kilns.
550,677. PATON, CALVERT AND CO., LTD., and PATON, W.: Boxes, tins, cans, or the like containers.
550,700. YOUNG, S. D.: Caps or closures for bottles and like containers.

Abstracts of Recent Specifications

Improvements Relating to the Production of Baked Goods

In the production of ordinary unfermented baked goods—that is, baked goods in which aeration is brought about entirely by means other than fermentation or the use of hydrogen peroxide, and in which, due to the presence of too concentrated a solution of sugar or to the time allowed between the mixing of the dough and its baking in the oven being too short, no yeast fermentation could occur—a claim consists in the incorporation in the mixing prior to baking of yeast solids in the proportion of 0·01 to 2 per cent. of the total weight of the ingredients of the mixing, including water.

In the production of unfermented baked goods as claimed above a further claim relates to the addition to the mixing from which the articles are made, prior to baking, of yeast solids in the proportion of 0·01 to 2 per cent. of the total weight of the ingredients of the mixing, and a substance containing a large proportion of water-soluble protein.

A third claim is, adding to the mixing from which the articles are made, prior to baking, yeast solids in the proportion of 0·01 to 2 per cent. of the total weight of the ingredients of the mixing and skim milk powder.

Further claims concern the addition of soya bean flour, a small quantity of an acid or an acid salt after adding yeast solids in the amount mentioned.

In the production of unfermented baked goods, as claimed, soaking a dried yeast preparation in water at a temperature not exceeding 120° F. until it becomes fully hydrated, and incorporating the hydrated yeast (in the proportion of 0·01 to 2 per cent. of yeast solids to the total weight of the ingredients of the mixing) in the mixing from which the articles are made, prior to baking.

The purpose of these several devices being in each case to obtain a golden brown or yellow colour in the baking operation.

546,666. The British Arcady Company, Ltd., Walter Percy Ford and William Edward Egerton.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

CORONET.—621,489. Milk. **Wilts United Dairies, Limited,** Hythesea Road, Trowbridge, Wiltshire; Manufacturers. To be associated with No. 440,765 (2393) xlii and others.
SOYGHETTI.—621,490. Paste in the form of spaghetti made from semolina and soya bean flour. **Cereal Manufacturing Co. (Chelsea), Limited,** 15, Lots Road, London, S.W. 10; Spaghetti Manufacturers.
CENTRE COURT.—621,840. Coffee, coffee and chicory, coffee extract, coffee essences, coffee and chicory extract; and coffee and chicory essences. **Twentieth Century Coffee Corporation, Limited,** 10, West Place, London, S.W. 19; Merchants.
COSMOS.—621,841. Coffee, coffee and chicory, coffee extract, coffee essences, coffee and chicory extract; and coffee and chicory essences. **Twentieth Century Coffee Corporation, Limited,** 10, West Place, London, S.W. 19; Merchants.

New Companies

McConnell's Kiosks, Limited. (378548.) 284-8, Derby Road, Liverpool, 20. To carry on bus. of caterers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: W. H. McConnell, Audley, Primrose Road, Liverpool, 18; R. K. Milne, Agincourt, Promenade, Southport, Lancs.

Surrey Wholesale Fruit and Potato Distributing Merchants Association, Limited. (378590.) To carry on bus. of fruit and vegetable growers and dlrs., and to co-operate with the Wholesale Fruit and Potato Distributing Association. Nom. cap.: £1,000 in £1 shares (600 management and 400 ordinary). Dirs.: Not named. Subs.: R. S. Kelling, 34, Pitlake, Croydon; G. J. Wright, Earlswood Road, Redhill.

C. Parrott and Sons, Limited. (378624.) 10, Regent Street, Weston-super-Mare. To carry on bus. of fruit mchts., bakers, confectioners, grocers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: C. J. H. Parrott and Rosina Parrott, both of 10, Regent Street, Weston-super-Mare; C. J. Parrott, 69, Moorland Road, Weston-super-Mare.

Taken from the Daily Register, compiled by Jordan and Sons, Limited. Company Registration Agents, 116, Chancery Lane, London, W.C. 2.